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THE LARYNGOSCOPE.

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RHINOLOGY IN CHILDREN. RESUME OF THE LITERATURE FOR 1953.

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and

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This resumé of the literature on Rhinology in Children comes from the Hospital for Sick Children in Toronto and the Department of Otolaryngology of the University of Toronto. The medical journals, including the pediatric publications of the United States, Britain and Canada have been reviewed. The classification of previous years has been maintained.

GENERAL ARTICLES.

Moncrieff¹ considers that infection in the newborn baby is much more prevalent than is commonly believed. To support this he quotes the 1947 figures of Agnes Macgregor who, working in Edinburgh, found infection to be the cause of neonatal death in 190 out of 618 infants, or 30.7 per cent. It was responsible for two out of every three deaths after the third day of life. He states that sepsis must be recognized if it is to be treated efficiently and that, unfortunately, there is evidence that the condition is often overlooked. To support this he states, *inter alia*, that at one hospital, figures show that in the first three days of life deaths due to infection, proved *post-mortem*, accounted for 15.4 per cent of the total deaths, whereas on the clinical diagnosis only 3.5 per cent were recorded as due to infection.

¹Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication July 26, 1954.

These facts are his arguments for presenting a long and well-planned discussion of the subject from a pediatric point of view.

One part of this discussion is germane to our resumé, for he states that the common cold is usually completely overlooked as a very common cause of the underlying trouble in these infants. When it kills, as it may quite often do in the newborn, and especially in the premature infant, it kills by broncho-pneumonia, or by gastro-enteritis. What seems clear is that it is often missed as a clinical entity. He points out that in a 1949 report by the Ministry of Health, for which he was partly responsible, covering the whole subject of neonatal mortality and morbidity, the section on infection in the newborn fails to mention the common cold.

Why is the common cold not recognized in the newborn? It is because the pattern of disease is different from the pattern in adults and so variable as to give little direct help in diagnosis, which has largely to be on circumstantial evidence.

Consider the clinical features of a small baby with a cold. Lying horizontally in bed, he seldom sneezes, and such excess secretion as is present from the nasal mucous membrane passes down the back of the throat. Obstruction of the nose may occur from time to time, leading in the early days of life to breathing difficulties, often quite wrongly attributed to "asphyxia neonatorum." The obstruction also leads to great difficulty over feeding, because the infant cannot suck properly. The result of this may often be engorgement of the breasts in the mother and failure of lactation — or the baby is weaned because he will not take the breast. The diagnosis of intracranial hemorrhage may be made at this point. Sometimes, but in his experience, rarely, some degree of snuffles and anterior canal discharge occur, often leading to a suspicion of syphilis and delay while this is excluded. By now the infant may have begun to vomit or have green stools as a manifestation of his parenteral infection.

Alternatively, infection may have spread down the respiratory tract and signs of involvement of the finer bronchi and

alveoli of the lungs appear. Whether or not the primary infection of the nose was a virus, there is by now secondary invasion — staphylococcal, or one of the Gram-negative group. All this may happen with surprising rapidity, and death may occur within a few days of the onset, again without any suspicion that the original infection was essentially of the upper respiratory tract. Again and again with this picture it is possible to track the infection back to the baby's contact with an adult who has a nasal infection. The mother herself may have a chronic sinus infection (as in one of his patients), or the trouble may have come from one of the nursing staff (in one instance a night nurse in a nursing-home where at that period the matron did not "hold" with masks). Things are perhaps a little better than they were, because the use of masks is more widespread, but so long as the cold is largely unrecognized in the baby for what it is, the menace will continue.

Diagnosis must precede treatment and if possible should include identification of the infecting microorganisms. This will put the use of chemotherapy and antibiotics on a rational basis. Breast feeding must be continued. Dehydration must be dealt with on the usual basis. The hemoglobin level must be watched.

This is a very brief summary of what may be a complicated and prolonged campaign of treatment. More important is the *prevention* of infection. A high standard of personal hygiene must be scrupulously observed by all concerned. The use of efficient masks by the nurses and visiting staff is, he thinks, all important, although there is a tendency to decry their value.

Rhoads² has written an excellent paper concerning the joint responsibility of the otolaryngologist and the internist in the removal of focal of infection.

He points out that there has been a waning of enthusiasm for removal of all accessible tissue suspected of harboring pathogenic bacteria. Some of the reasons have been: 1. Failure of patients with systemic disease to get well in a number

of instances after removal of foci of infection; 2. The observation that many people with obvious active foci of infection do not suffer from systemic maladies usually attributed to such foci; 3. Failure to demonstrate any focus of infection in many patients with such diseases as long standing rheumatoid arthritis, subacute bacterial endocarditis and nephritis; 4. Finally the failure to completely remove foci of infection so that it is possible to demonstrate tonsil remnants in 72 per cent of young adults who have previously undergone tonsillectomy.

Rhoads feels that the excesses of the first two decades of the century are to be deplored but points out that the above arguments against the importance of focal infection do not hold water.

He states that no one can deny that bacteria growing in thrombi at the roots of infected teeth or in tonsillar crypts are frequently the cause of subacute bacterial endocarditis. Also who can deny that bacteria flourishing in a localized focus by their toxins cause remote effects such as the rash of scarlet fever and the paralysis and myocardial lesions of diphtheria.

Modern medical literature is now suggesting that an important effect of low grade infection is the sensitization of certain tissues of the body so that they hyper-react to super imposed infection giving rise to the so-called collagen diseases, such as rheumatic fever, disseminated lupus erythematosus and probably acute nephritis.

Why some humans can harbor continuing low grade infections over long periods without developing systemic disease is poorly understood; but it does not invalidate the possibility that infection in others may act as so-called tissue sensitizers, and failure to observe swift improvement in systemic disease following removal of foci does not prove that the focus was not involved in the entire phenomenon. He cites a parallel that plugging the hole in a boat to remove water already accumulated will not be effective, but it does not prove that the hole was not responsible for the accumulation of the water.

Careful examination and bacteriological studies may be necessary to prove a focus of infection does exist. A table showing the organisms normally found in nose and throat, and those organisms which can be considered as pathogens accompanies the paper.

Throat cultures may be misleading because frequently ordinary throat cultures may reveal no pathogens whereas cultures made by grinding excised tonsils from the same patient in a mortar with sand and broth will lead to recovery of streptococci.

Since the advent of sulfa and the antibiotics even deep seated infections can be cleared up by vigorous drug therapy, but there remains a considerable proportion where the foci persist despite conservative treatment and prevention of such chronicity is the joint responsibility of the internist and the otolaryngologist.

Tonsillectomy and adenoidectomy, surgical drainage of sinuses, incision of ear drums and frequently mastoidectomy will continue to be necessary to prevent at least in part, the chronic systemic disorders such as rheumatic fever, rheumatoid arthritis, iritis, bronchiectasis, chronic anemia and nephritis.

The physician is almost daily confronted with evidence of the impact of weather and climate on ear, nose and throat diseases.

Kinkade³ discusses this topic and points out that the entire human organism is immersed in an ocean of air which affects every physiologic function.

There are constant changes taking place in the surrounding air to which the organism must adjust satisfactorily. Some people make these physiological responses readily, while others may react so massively that in the upper respiratory system complete blockage of the nose occurs with much sneezing and profuse mucoid discharge.

These individuals are said to suffer from vasomotor rhinitis due to domination by the sympathetic nervous system.

Sudden chilling, drafts, air pollution, rapid changes in temperature, and pressure fronts which lead to climatic crises are all factors which require adjustments on the part of the exposed individual. Failure to respond satisfactorily can lead to sinus infection, sore throat, Eustachian tubal catarrh or perhaps epistaxis such as in mountain sickness due to thinning of air.

Humans vary in their reactions to these stimuli, *e.g.* allergic subjects and those with vasomotor rhinitis tend to over respond. The result is that frequently the question arises as to the advisability of recommending a change of climate for a patient. The decision is not easy, and at the present state of knowledge the physiology of climatic response does not lend itself to comprehensive generalization; but with careful selection of cases, climatic therapy is a highly flexible adjunct to otolaryngology. Additional observations and continued research may be expected to improve our understanding of the very definite effects of weather and climate on the upper respiratory tract.

In discussing the thymus problem Littleton, Motsay and Perry⁴ were unable to show any compression of the trachea by the thymus gland. They used X-rays, fluoroscopic examination and cadaver experiments with iodized oil (Lipiodol). They disagree with many autopsy descriptions of sudden death being caused by tracheal compression by the thymus gland. They have had no experience with status thymico-lymphaticus and agree with former writers that there is no evidence that status thymico-lymphaticus exists as a pathological entity. They do believe that Roentgen therapy has a beneficial effect on low grade chronic or recurrent tracheobronchitis which may produce stridor and cough and sometimes cyanosis.

SINUSITIS.

Dingley⁵ states that the aim of all nasal surgery should be to achieve the end result with as little trauma to intranasal structures and sinus mucosa and as little interference with nasal physiology as is consistent with success. He then discusses generally temporary drainage and permanent drainage

of the maxillary antrum, and finally contrasts intranasal an-trostomy and the Caldwell-Luc operation under the following headings: accessibility of the surgical approach, surgical technique and instruments employed, indications for each operation and the disadvantages of each method. His arguments will repay study.

Most of his paper deals with the adult, but he has this to say regarding children.

"In children up to the age of 10 years permanent drainage is well-nigh impossible to attain and bone if traumatized will make every endeavor to regenerate. The antro-nasal wall is sometimes surprisingly thick and tough; consequently, operations for drainage are usually unsuccessful, and if attempted are likely to result in closure or contracture to a minute opening useless for drainage purposes. The consequent trauma to intranasal tissues, and possible damage to tooth buds appears unjustifiable, since so little is gained at such expense. Children react better than adults to puncture and wash-out, but seem to resent trauma to their intranasal mechanism even more than the latter. Polythene tubes are most useful.

A paper on the incidence of chronic infection of the maxillary sinus in children has been written by Mawson and Gray.⁶ In 50 children admitted for routine removal of tonsils and adenoids they found an incidence of unsuspected pathological infection of the antra of 22 per cent. In another series of children who were suspected to have antral infections the washings were found to be infected in 45.4 per cent.

In these investigations the washings were obtained by a two cannula method and the specimen was centrifuged for 10 minutes. After the supernatant fluid was removed the concentrate was examined by direct smear and was cultured as well. With increasing experience the films were found to be more informative than the cultures.

The examination of the direct smears on films suggested that they could be grouped into four categories:

I. Antral response to trauma. These films contained a large number of red cells, a few well stained polymorphs and isolated well stained epithelial cells in which the distinction between the nucleus and cytoplasm was well defined. There was no fibrin. No cellular debris and no organisms were seen.

II. Short standing antral infections. A little fibrin was present and a variable number of well stained polymorphs. Monocytes were seen and scattered well stained epithelial cells together with the occasional smudge cells. Organisms were present in variable numbers.

III. Early chronic antral infections. A moderate amount of fibrin. The polymorphs have lost the staining differentiation between nucleus and cytoplasm and there are many smudge cells. There was much debris and organisms were present in variable numbers.

IV. Late chronic antral infections. These films showed much fibrin and all characteristics were difficult to make out because most of them had smudged. Epithelial masses were present but resembled lumps of amorphous debris. Organisms present stained in such a way as to suggest they were dead. Gradual cellular lysis had continued so that the end result was an acellular network of fibrin containing a few scattered organisms.

With the exception of the traumatic group these categories were not well demarcated and tended to merge into one another.

This is a very interesting paper and contains a section dealing with literature on this subject and discussion of controversial points.

Davison⁷ discusses hyperplastic sinusitis and the results of his treatment of 50 cases. He feels that the polypoid thickening of the nasal sinus mucosa is best explained on the basis of local sensitization of the submucosal tissues to bacterial proteins.

These patients usually can recall that their symptoms

began with an acute severe febrile respiratory infection. Strangely enough they seldom complain of headache.

After careful history taking, in addition to the usual ear, nose and throat examination, he takes smears and cultures, X-rays the sinuses, and lavages all cloudy antra as a diagnostic procedure.

Because these patients may be sensitive to other than bacterial proteins, a careful history in that respect is important, and skin tests should be done when indicated.

Microscopically the tissue changes are excessive edema, increased numbers of eosinophils and relatively fewer neutrophils. These appearances give the impression that they are reversible changes, and he has felt that the best method of treatment was to use large bacteriocidal doses of penicillin plus cortisone to shrink the edematous tissue. Surgical procedures are reduced to a minimum.

Best results have been obtained by using doses like two million units of fortified penicillin every four hours for a period of at least a week along with Cortisone, which is kept up for two weeks, starting with an initial daily dose of 200 mgms., but reducing this so that the total dose averaged about 900 mgm. per patient.

Skolnik, *et al.*⁸ have reported on rhinogenous complications in the antibiotic era. Widespread use of these drugs has not eradicated severe intracranial complications of acute and chronic infections of the nose and paranasal sinuses.

The neurological manifestations do not always conform to a classical pattern, but the otolaryngologist must be alert to recognize the neurological symptoms and signs and must be able to treat the primary focus and the complications.

In all types of intracranial infections which arise by spread from the nose or sinuses four tissues are exposed—nasal and sinus mucosa, bone, meninges and brain. The spread may be by direct extension or contiguity, or it may be by continu-

ity along the blood vessels through bony dehiscences or along the sheaths of the olfactory nerves.

The following complications can occur: 1. Extradural abscess occurs more commonly by direct extension backwards from an infected frontal sinus, usually with associated osteomyelitic changes. 2. Subdural abscess or subdural empyema is due to inflammation of the inner surface of the dura, which usually produces a purulent exudate. If the spread is by direct contiguity, it is easily recognizable at operation, but in some cases infection may travel by way of anastomosing veins from sinus mucosa to inner layer of dura without producing inflammation of the outer layer. In the latter patients the relatively normal appearance of the dura when exposed at operation must not be permitted to prevent adequate search if the symptoms warrant it. 3. Brain abscess. Again extension may be by contiguity or by continuity. If by contiguity, gross changes occur in the bone and dura, but when spread is by continuity brain abscess may develop with no significant changes in the overlying bone and dura. Brunner found normal bone in 70 per cent of brain abscesses, and normal external dura in 44 per cent.

The authors then present and discuss five cases, and the information as to diagnoses and management is well worth reading in its entirety.

Lillie⁹ points out that the occasional intranasal cyst may rupture and discharge varying amounts of fluid. This fluid contains both chlorides and sugar, and may easily be misinterpreted as being cerebrospinal fluid, unless the physician is aware that fluid from intranasal cysts can contain moderate amounts of chloride and sugar.

The chief distinguishing features are that fluid from the intranasal cysts is yellow as compared to clear spinal fluid, also that fluid from intranasal cysts will clot readily if allowed to stand.

Ornston¹⁰ reports on the new polyethylene spray bottles which are now being marketed as a means of administering many well known nasal medications.

He evaluated the bottle in three ways. First by observing the nasal coverage of sulfathiazole crystals obtained by its use. Second by comparing the results of spray and drop medication in 49 patients and lastly by making X-ray studies of a radio opaque medium administered by drop and spray bottle method.

He found that the effectiveness of the spray depended upon the potency of the common meatus. If two applications are used the first spraying will open the meatus enough for the second spraying to reach the olfactory fissure.

In the clinical study on 49 patients there was no important observable difference in the effectiveness of the two methods. The spray bottle seemed to provide adequate coverage.

X-ray examinations showed that coverage by properly applied drops was superior — but that coverage by spray bottle was effective, and providing two sprayings are used, one shortly after the other, the spray bottle method is probably the treatment of choice for those patients who find it impossible or inconvenient to use the drops properly.

ALLERGY.

James, Brand and Pepys¹¹ emphasized the growing respect for the allergic aspect in the treatment of children having upper respiratory infection and the need for a concerted approach by the otorhinolaryngologist, the pediatrician and the allergist. All the speakers agreed that the diagnosis of allergy is based on the clinical history, a personal or family history of allergic disorders and the presence of eosinophil cells in the nasal smear.

The smooth swelling of the sinus mucosa seen on radiography and its rapid reversibility were described; also the rubbing and flattening of the nose, aptly termed the "allergic salute" by which these patients try to relieve the typical and often intense itch of allergic conditions. While it was shown there was a case for "bacterial allergy" it was also pointed out bacterial allergy was not universally accepted as a cause of

typical allergic rhinitis. Treatment of allergy before and after any operative treatment was advised.

Allergic rhinitis and paranasal sinusitis in children frequently present the otolaryngologist with a distressing and baffling problem. A new approach to the problem is presented by Harper¹² whose thesis must be studied in its entirety.

He presents the hypothesis that in times of stress "morbid echoes" of obsolete defense reflexes may be manifested which are parallel to, if not co-existent with those anatomical and histological vestiges which link man with long-forgotten ancestors. A convenient example of a reflex defense mechanism of the type under consideration is provided by olfaction. During long eras olfaction was vital to the continuation of the race. Olfaction became supplanted in the recent evolutionary past only when the development of other senses led to its relegation to the very minor role seen in man. It would be remarkable, in his view, if we did not find today manifest in times of stress physiological vestiges of this defense reflex.

In his paper certain clinical aspects of a small representative group of asthmatic and allergic children living at a family school under conditions especially favorable for observation are outlined. A summary of the clinical records of each child mentioned, often covering a period of years, is available on application to the Editor of the B.M.J. or the author.

During recent years there has been a small proportion of severely allergic children at this family school who, previous to arrival, had had much treatment without success. Such children arrive at the school with some or, in certain cases, all of the apparatus and regimen so familiar to everyone who has had to deal with this most difficult and frustrating type of illness. Special bedding, sprays, nose drops, ear drops for the not infrequently associated otitis media, are prominent, together with a compilation of the causes, climatic and dietetic, that have produced attacks. Often copies of prescriptions from medical authorities on allergy and ampoules for frequent injection accompany the child.

For several years it has become the practice at this school to cease every drug and prohibition on arrival, and it is found that the child settles down easily, and soon loses the asthmatic or other allergic manifestations, however severe or protracted the condition may have been. It would seem that the threshold at which an attack can be produced has been raised to a significant degree. The turgescence of the olfactory mucous membrane found in this catarrhal type of child rapidly subsides, the obstructive threat to adequate sinus drainage is removed and the paranasal sinus infections that seem to be an almost constant accompaniment of the asthmatic diathesis quickly clear up. As a result, the existing ear discharges cease and there is a noticeable increase in well-being that is apparent to everyone, and most of all to the child itself. Self-confidence rapidly increases as the child finds that things can be eaten, and done, without producing any attack. Colds which in the past have so frequently produced asthma, often complicated by acute sinus infection and bronchitis, are now only colds and run a normal course.

Now, it is his experience that in this little community the diverse manifestations of allergic disease are unified in that the entire syndrome with its complications improves dramatically, and the rare attacks that occur while the child is within its influence can usually be traced to some threat to security, such as the mishandling or anxious treatment of the children by a member of the staff during the temporary absence of the principal. Another fertile cause of relapse is the arrival of one of the parents or relatives.

Only slight quotations from this arresting paper have and can be given here.

He states the above are examples only of a consistent pattern observed by him in the group of allergic children that have passed through this community. Without drugs, without nursing, without doctoring for their allergy their problems have largely ceased to exist so long as there has been no introduction from without, or from within, of stress, anxiety or insecurity.

Violent reaction to stress is frequently seen in children who are sheltered to an almost abnormal degree from the real danger and climatic changes. How often the intelligent mother of a small family bewails to the doctor as she tends her stressed child: "It seems that the more care I take the more illness she produces; the neighbors' children run the streets without supervision or care, and they seem hardly ever to be ill."

Stewart and Kawa¹³ report personal observations and investigations in the therapeutic effects of cortisone and ACTH in 33 cases of nasal allergy, which do not, however, include hay-fever.

The clinical material for this investigation consisted of 33 patients of whom 24 were females and 9 males and their ages ranged from 11 to 61 years. Twelve cases gave a family history of allergy. The diagnosis was based on three main symptoms which generally were present in the following sequence; attacks of sneezing which took place first thing in the morning, followed by nasal obstruction, and then a clear profuse discharge which occurred after the relief of the obstruction. The diagnosis also depended upon the appearance of the interior of the nose as seen by anterior and posterior rhinoscopy; this showed the unmistakable picture of allergy of the soft tissues. An X-ray examination of the paranasal sinuses was also carried out to eliminate any gross underlying infective process. Twelve of the cases showed soft tissue swelling in one or both of the antra, while the remaining 21 cases were normal. In those cases which showed changes, a further X-ray was taken on the conclusion of the initial treatment and all except one showed an improvement in the one containing space and a shrinkage of the swollen soft tissues.

On admission a small piece of tissue from the nasal mucosa was taken for biopsy. The nose was examined each day. Prior to discharge a second biopsy from the same region of the nose as the first was taken. The day following their discharge from the hospital they returned to commence their maintenance treatment as out-patients.

The Cortisone used in the investigations was that manufactured by Merck and Co., of New York. It is in the form of a saline suspension of cortisone acetate.

Cortisone is most commonly given by the intramuscular route by a single daily injection, or, in their experiment, it was better divided and administered at six-hourly intervals during the active stage of treatment. It may also be administered by the mouth either as tablets or in suspension. The tablet is usually 25 mg. or, if in suspension, a similar dose in 4 cc. bulk. The oral route is considered quite satisfactory, but larger doses have been found necessary to achieve the same results as by intramuscular injection.

They employed the ordinary ACTH as supplied by Armour. They gave it intramuscularly in divided doses at six-hourly intervals. They also used it as a nose spray following the initial treatment by the intramuscular route in eight cases. Only in three cases was this method of treatment by itself successful; the other five cases required maintenance doses by injection as well.

They used Cortisone by itself in six cases, Cortisone combined with ACTH in four, and ACTH alone in 23 cases — these groups are designated A, B, and C.

The investigation was undertaken in the past six months, so they have only short-term results of treatment. They must wait for a further period for long-term results.

In group A, three were completely free of symptoms, two much improved and one improved. In group B, two cases were completely relieved, one was much improved, and one failed to continue treatment although he had greatly improved while in hospital. In group C, 14 were reported as being free of symptoms, seven were much improved, one improved and one unimproved.

The authors claim to have evolved a form of treatment for simple and chronic allergic rhinitis where a large proportion of the cases have been free of symptoms or vastly improved.

They consider the treatment reasonably safe if carried out with intelligence and care and if used in selected cases and not indiscriminately.

Shahinian¹⁴ in a paper on vasomotor rhinitis describes this phenomenon as a nasal manifestation of disturbed neurovascular physiology. This disturbance may be due to: 1. Chronic nasal allergy, 2. Endocrine or metabolic dysfunction, 3. Psychomatic personality states, 4. Miscellaneous factors, such as climatic or thermic conditions and derangements of calcium and starch metabolism.

The ideal treatment, of course, would be to eliminate whichever cause or causes may be giving rise to the disturbance in neurovascular physiology. Often, however, the cause can not be determined, or if determined cannot be eliminated; therefore, the rhinologist must frequently have to resort to some form of nonspecific local therapy to provide relief. There has been a host of local treatments advocated, but the one that appears to offer the most advantages is the method of submucosal galvanocautery.

Of the several outstanding symptoms of vasomotor rhinitis, that of impaired breathing is the most responsive to this method of treatment. Large tumescent turbinates which still will respond to vasoconstriction are the most suitable with less dramatic results if secondary fibrous hypertrophic changes are present.

Shahinian describes his indications and methods of treatment in detail and as well discusses a modified instrument and instructions on its calibration by the rhinologist before use. His results have been most gratifying in 412 patients treated over the past 12 years. Relief of stuffiness may last from two to ten years.

This is a most interesting paper and should be read in full.

ANTIBIOTICS.

Dingley¹⁵ considers there is no field of surgery where warning against the unwise use of antibiotics is more needed than

in otolaryngology. It is a basic surgical principle that pus, wherever accessible, requires drainage, and the tendency in some quarters today to substitute these agents in place of surgery should be strongly resisted; thus therapy can be used very early after the onset of acute otitis media with safety and benefit, but it must be accompanied by repeated examinations of ear-drum and hearing in order to see that resolution is taking place.

One aspect of the action of antibiotics which he thinks is not sufficiently realized is their ability to forestall infection of certain organs and tissues. It is impossible to say how many ears and nasal sinuses have escaped infection, particularly in the acute specific fevers, as a result of their attack on the nasopharyngeal infection, but it is certainly a very large number. By their beneficial effect on the blood-stream infection they must frequently prevent pulmonary and renal involvement. They thus provide a prophylaxis against extension of infection hitherto unknown. By doing so much for the patient, however, they induce him to become lazy in his own interests, with the result that efficient immunity is not built up as it would be if the infection had been fought unaided; this may explain the frequent recurrences, often over a short interval, noted in acute otitis media, suggesting that complete recovery from the first attack had never taken place.

Schenck¹⁶ reports on some of the problems encountered in the use of antibiotics in otolaryngology. Entirely new criteria for diagnosis and treatment must be evolved when the otolaryngologist first sees a patient who has received antibiotic therapy for days or weeks or even months.

The problem of preventing hearing loss following acute otitis media has become more complex since the introduction of antibiotic agents. This is because of the erroneous idea that paracentesis has become obsolete: a view held by many general practitioners and pediatricians. Early adequate antibiotic treatment will usually make paracentesis unnecessary, but improperly directed or late therapy will often reduce pain and fever and lead to a false sense of security which may

result in unfortunate sequela such as deafness, mastoiditis or even intracranial spread. When frank bulging of the ear drum persists for more than 24 hours in spite of antibiotic therapy, paracentesis is imperative if serious damage to the conduction apparatus is to be avoided. In younger children hearing defects are especially serious and may go undetected for a very long time during a period when adequate hearing is so important to normal progress.

These limitations must be emphasized by the otologist, and hearing tests should be insisted upon after recovery from attacks of otitis media.

New and unusual infections have appeared as another result of antibiotic therapy. There has been an increase in the number of proteus and pseudomonas infections and of moniliasis following the use of wide-spectrum antibiotics. Even such rare causes of human disease as *E. coli* and aspergillus have appeared as predominating organisms in infections of the upper respiratory tract. Penicillin-resistant staphylococci have become a real danger.

Antibiotic reactions such as glossitis and black or hairy tongue are not uncommon. These lesions may be sensitivity reactions or may be the result of antibiotic induced vitamin B deficiency.

Structural damage may also occur as direct toxic effect of antibiotics. Sometimes loss of taste or smell may result, or loss of vestibular and labyrinthine function from toxic effects of streptomycin or dihydrostreptomycin therapy. Eighth Nerve complications vary directly with the daily dose and the number of days such daily doses of streptomycin or dihydrostreptomycin are administered. They are always bilateral and appear more abruptly with the dihydro-streptomycin and more gradually when streptomycin is used. Slight changes are reversible, but severe damage is permanent. When deafness occurs it is preceded by tinnitus. Dihydrostreptomycin impairs the cochlear mechanism more readily than streptomycin but is less injurious to the vestibular apparatus.

Schenck states 30 to 40 per cent of individuals receiving dihydrostreptomycin acquire a perceptive deafness of 30 or more decibels. The symptoms have appeared after therapy has been discontinued for as long as 24 days. The question has arisen that antibiotics may be a potential cause of prenatal acquired deafness. The foetal auditory apparatus is especially vulnerable during the first three months of gestation but the effects of streptomycin therapy during this period are still unknown.

Bunn¹⁷ points out that there are now available many antibacterial agents which can be of aid to the host in defending himself against invading microorganisms.

Most human infections can be controlled with one or more drugs administered wisely.

He feels that with a few exceptions it is wiser to use one drug alone and in adequate dosage than to use combinations of drugs. He also favors parenteral administration of antibacterial drugs unless the area of infection is so avascular that blood-borne drug is unlikely to reach the lesion in sufficient concentration. Under these circumstances local therapy is advisable.

Duration of therapy should be at least five days and he reports, that following streptococcic sore throat, when antibacterial therapy is stopped in 48 to 72 hours because the local inflammation has subsided, there is a significant increase in the incidence of rheumatic fever and glomerulonephritis.

In meningococcic and pneumococcic meningitis he favors massive parenteral therapy with penicillin and recommends 1,000,000 units q.2h. continued for from 10 — 14 days. This dosage can reduce the mortality rate of otogenic meningitis to less than 25 per cent.

Tuberculosis is an exception which must be treated with combined drugs. Streptomycin with paraaminosalicylic acid or with Isoniazid. These combinations discourage emergence of resistant organisms and reduce the toxicity of the strepto-

mycin. In the latter regard dihydro-streptomycin used over long periods is much more toxic to the eighth cranial nerve than is the parent substance.

He does not feel that antibacterial agents alter the course of or prevent secondary infections if used in treatment of the common cold.

Huang and High¹⁸ compared the results obtained in treating common infections encountered in infants and children with penicillin administered orally every four hours with those obtained when oral penicillin was given every 12 hours. The series included 292 children observed through 308 infections. The conditions treated were all otolaryngological and other upper respiratory infections. Three therapeutic programs using orally administered penicillin were compared. In the first, 200,000 units of potassium penicillin-G in a liquid vehicle were administered as an initial dose, followed by 100,000 units at intervals of four hours. In the second program 300,000 units of the same potassium penicillin-G preparation was given at intervals of 12 hours. The third group consisted of the oral administration, of 300,000 units of procaine penicillin at 12-hour intervals.

The authors found that the patients who received 300,000 units of penicillin at intervals of 12 hours responded as satisfactorily as did those who received 200,000 units as the initial dose, followed by 100,000 units every four hours. The effectiveness of procaine penicillin was comparable to that of potassium penicillin-G when each was administered in equivalent amounts at intervals of 12 hours.

A study of the comparative effect of penicillin, aureomycin and terramycin on streptococcal tonsillitis and pharyngitis was carried out at Warren Airforce Base by Denny et al.¹⁹ A homogenous group of early streptococcal infections was selected by the following criteria; 1. Exudate on tonsils or pharynx. 2. A total leukocyte count of 10,000 or greater. 3. Duration of symptoms less than 31 hours.

Fifty-three patients were treated with penicillin, 53 with aureomycin, 51 with terramycin and 50 received placebos. A beneficial effect was demonstrated in all patients receiving penicillin, aureomycin or terramycin. No one drug was consistently more effective than the other two. The incidence of anorexia, nausea and vomiting was high in the aureomycin treated group, and both aureomycin and terramycin increased the incidence of loose stools. From the standpoint of toxicity, penicillin is the drug of choice.

Penicillin was more effective in the eradication of streptococci from the throat.

The dosage used was: — crystalline procaine penicillin-G., 600,000 units daily for 5 days.

Crystalline aureomycin hydrochloride 1 gm. on admission and 0.5 gm. every 6 hours for 19 additional doses.

Crystalline terramycin hydrochloride 1 gm. on admission and 0.5 gm. every 6 hours for 19 additional doses.

Controls: — lactose placebos every 6 hours for 20 doses.

The absorption of chloramphenicol had been studied in the adult and the child, but there was no adequate information on the newborn. This led O'Brien²⁰ to investigate the newborn as there were good reasons for supposing that the absorption of the drug may be difficult in the first 10 days of life.

The investigation was based on 173 observations on 68 infants. The palmitate suspension was given just before the feed either by spoon or in the bottle diluted with an equal amount of breast milk or dried milk mixture. The crystalline preparation was individually dispensed and added to the feed as a powder. No difficulty was encountered in giving the drug in either form; however, a number of infants receiving higher doses of both preparations vomited after 24 - 48 hours and continued until the drug was stopped.

Venous samples were taken and assays performed in the laboratory. The results showed that crystalline chlorampheni-

col was more quickly and completely absorbed in the newborn than the palmitate form, the use of the latter offering no particular advantage. The dosage suggested was 25 mgm. per kg. of the crystalline preparation every six hours. If the palmitate preparation were used the dosage recommended was 100 mg. per kg. initially followed by 25 mg. per kg. every six hours.

TONSILS AND ADENOIDS.

Tremble²¹ is of the opinion that the arrangement of lymphoid tissue commonly called the "ring of Waldeyer" is not at all well understood even at the present time. We do know, however, that the adenoid tends to atrophy after puberty and as a rule disappears entirely between 18 and 20 years of age. In view of this it would appear that the various groups of lymphoid tissue act as a means of defense at the entrance of the respiratory and digestive systems in the first ten or 12 years of life.

It should be kept in mind that the majority of children build up a natural immunity to upper respiratory infections between six and seven years of age and this is the period when tonsillectomy is most frequently performed.

When are tonsils normal and when are they abnormal? This is of course a very difficult question to answer. Small chronically infected buried tonsils often show a higher bacterial count than hypertrophied ones containing large crypts. Epithelial debris or cheesy plugs which can often be expressed from the crypts of healthy individuals are not as a rule harmful. On the other hand when thick creamy pus can be pressed out repeatedly, especially in the presence of fibrosis, there is more likelihood of absorption. Every laryngologist knows that many persons harbor hemolytic streptococci in pure culture without any untoward symptoms.

The author thoughtfully covers many aspects of this controversial question and concludes that each case must be decided on its own merits. A careful history in conjunction with

thorough examination and long clinical experience are still of the utmost importance.

Proud²² writes that in a certain metropolitan community in 1951 a hospitalization insurance company paid claims to 1,264 obstetrical cases as against 1,311 claims for tonsillectomy during the same period. This leads to the realization that the operation is still performed with amazing frequency. With the advent of antimicrobial therapy operations for the removal of lymphoid tissue have diminished in number yet certain specific indications remain. Among these are perhaps most commonly mouth-breathing due to enlarged adenoids, and in these cases he recommends pre-operative palpation of the post-nasal space which although distasteful is less so than an unsatisfactory surgical result.

Recurrent attacks of otitis media may cease after adenoidectomy especially if lateral band dissection and removal of the tubal bud are carried out. In this regard he is of the opinion that despite the number of palate retractors and "round-the-corner" devices adenoidectomy is still essentially a blind procedure. Failure of the procedure to achieve results is, therefore, surprisingly rare but does occur if the operation is incompletely done and in cases of irreversible middle ear disease or in autonomic dysfunction of the middle ear membrane.

In cases of persistent secretory otitis not due to autonomic dysfunction, adenoidectomy may bring relief, and he advocates myringotomy at the same time for added assurance of relief.

In case of vasomotor rhinitis further aggravated by adenoid hypertrophy adenoidectomy may achieve gratifying results, but the operation should only be advised after repeated examinations have shown that the adenoid is definitely contributing to the obstruction.

Today adenoidectomy is frequently done without tonsillectomy and these children have a minimum of discomfort and few postoperative complications.

Tonsillar hypertrophy, unless very great and sufficient to cause dysphagia or respiratory distress, is not an indication for removal.

Quinsy and recurrent Vincent's infection are positive indications as well as removal to free an individual of the carrier state of diphtheria.

One or two mild attacks of tonsillitis are no indication for surgery, but frequent or unusually severe attacks are indications for operation.

The ideal age for tonsillectomy is when the trouble begins.

Blassingame²³ pleads for more realism in the surgery of the tonsils and adenoids.

At least 50 per cent of the cases are operated upon by individuals unqualified by training to perform this operation.

Because of the importance of pharyngeal lymphoid tissue in infections of this area, thorough removal is necessary. Complete extirpation should include the faucial tonsils, the lingual tonsil, the pharyngeal tonsil, plus all secondary lymph nodes.

The faucial tonsil offers the least difficulty, but unfortunately the importance of preserving the posterior pillars is not fully realized. The elimination of one or both pillars distorts the palate and may affect the modulation of the voice.

The lingual tonsil warrants removal in at least 85 per cent of tonsillectomized patients and must be done carefully.

He urges most thorough removal of pharyngeal tonsil and advocates the Yankauer nasopharyngeal speculum and an assortment of punches for removal of lymphoid tissue in the lateral pharyngeal recess.

Unger²⁴ has devised an instrument which he has found reduces immediate operative hemorrhage after removal of adenoids and also lessens the possibility of secondary bleeding.

He feels that both primary and secondary bleeding are more frequent from the adenoid site than from the tonsil beds, because the adenoids are removed with sharp instruments, and, therefore, the area is deprived of the tearing and crushing of the tissues that occurs during tonsillectomy.

His instrument is a knurled roller fitted to the handle and shaft of an instrument that is much like an ordinary adenoid curette. As soon as the adenoid has been removed, the area is rolled with strong pressure to compress and lacerate the bleeding tissues, so that the openings of the blood vessels are crushed together and closed. The rolling also serves to crush any small flat collections of adenoid tissue that may have escaped the blade of the adenotome

McKenzie²⁵ reviews the risks of tonsillectomy. He gives account of a number of disasters which were the experience of one surgeon, although some of them were under the care of colleagues; but each disaster was so unusual and so tragic that it was recounted in detail and discussed by the whole hospital staff.

The risks of today, he admits, are fewer than those of 20 years ago. The chance of serious infection has nearly disappeared. Acute otitis media and its sequelae are much less frequent. The anesthetic risk is less now when the anesthesiologist is of specialist rank.

He believes that for tonsillectomy the surgeon needs a patient who is deeply anesthetized and has had a smooth induction of anesthesia. He finds that the inexperienced anesthetist keeps his patient under too light anesthesia. The best anesthetic he has seen for tonsillectomy is intravenous thiopentone combined with an intratracheal tube which delivers oxygen.

He divides the risks into four groups: those at the time of operation, those immediately after operation, those within 24 hours, and those later than 24 hours after operation.

At operation the risk that is uppermost in the mind of the surgeon is hemorrhage. He states that it is unfortunately true that the neater the surgical work the greater is the risk of bleeding at the time of operation.

During recovery from the anesthetic the patient should be kept on his side where everyone entering a ward can see him.

Hemorrhage within 24 hours after operation is the terror, he states, of all who look after cases of tonsillectomy. The correct treatment is to tie the blood vessel under general anesthesia. The anesthetist must be an expert. He states that bleeding from the nasopharynx is fortunately rare.

Hemorrhage after the first 24 hours after operation is seldom serious, and only once in the last ten years has he had to tie a blood vessel for this reason. The prevention of secondary hemorrhage lies in the prevention of slough in the tonsillar fossa and a help toward this is strict cleanliness in the operating theater. A final risk that must be mentioned is the mistake of leaving a swab behind. He tries to avoid this by feeling both fossae and the nasopharynx at the end of the operation and then looking into both fossae with the help of a headlight.

Five of the cases described died.

Comment: This paper is useful in that it frankly exposes the errors that were the causes of the disasters. An error recognized is an error that can be avoided. On the other hand, there are several matters of technique and of theory which are completely foreign to generally accepted practice on this continent. In our hospital more tonsillectomies are performed than in the six other large hospitals of our city together, and in the last 30 years only one such disaster has occurred.

Symonds²⁶ suggests that the manipulation of the head and neck under anesthesia, and especially maneuvers involving hyperextension, may be not without danger of causing serious symptoms in persons already suffering from cervical spondyl-

osis. In support of this he cites several cases. Two of these — aged 36 and 27 years, had quadriplegia following tonsillectomy, with proof in one case of compression of the cord by a prolapsed intervertebral disc.

As the result of the cases head position during tonsillectomy has become very important medico-legally. Hence Ballantyne and MacDermott²⁷ examined the tracheo-bronchial tree bronchoscopically in 100 consecutive children after removal of the tonsils by dissection and the adenoids by curettage. The Boyle-Davis gag was used in each case. Three carefully described techniques were used, 50 cases in one, 25 in each of the others. Blood was found in the trachea in 12.

They state that the laryngologist is faced with two possible courses, neither of these without risk. In the first place, he can perform tonsillectomy in the hyper-extended position and run the extremely small, but equally serious, risk of paralysis from protrusion of an intervertebral disc. Such a possibility can be minimized by the exclusion, through investigation, of an existing disc lesion; but a disc lesion may be present without symptoms and accidents can also occur with a normal disc. The second course is to perform the operation in a position of less extension and to run the risk of allowing blood to be aspirated in the tracheo-bronchial tree. This hazard, though numerically much greater is obviously less serious than the first, as the blood is effectively removed by coughing when the depth — or, more correctly, the shallowness — of anesthesia is properly controlled; furthermore, most of the respiratory complications that may follow aspiration can be readily detected and efficiently treated.

They feel that a satisfactory position could probably be attained by placing the "thyroid" pillows under the shoulders and maintaining, but not in any way exaggerating, the extension so afforded by gentle support of the Boyle-Davis gag. This maneuver would aim primarily at maintaining an efficient airway; any further tilt required to prevent aspiration of blood could then be made by lowering the head of the table.

Comment: One of the authors of this resumé has for 30 years avoided trouble by not using the Boyle-Davis gag, by

not using a thyroid pillow, by operating rapidly, by turning the patient in the lateral position immediately the operative work is finished, and by insisting that the anesthesia be so controlled that the patient coughs within one minute of the termination of the operation.

Johnston²⁸ commenting on the subject believes that the cases cited by Sir Charles Symonds are a warning against hyper-extension of the neck. The reason for the extended position is to prevent blood entering the bronchial tree. Flooding of the laryngeal opening can be prevented by intratracheal intubation with a large-bore tube.

Godwin²⁹ tabulated the signs and symptoms of each of four hundred school children before and after removal of tonsils and adenoids. The average age of the children at the time of operation was eight years. The average time after operation at which the re-examination took place was one year and three months.

Before Operation				After Operation		
Signs and Symptoms	No. of Cases	Cured	Percent-age Cured	Im-proved	No Change	Percent-age No Change
Enlarged cervical glands.....	339	200	59%	113	26	7.6%
Frequent sore throats.....	306	221	72.2%	77	8	2.6%
Frequent colds.....	110	72	65.4%	30	8	7.2%
Mouth breathing.....	203	—	—	13	190	93.5%
Hearing defect.....	48	11	23%	—	37	77%
Suppurative otitis media.....	13	3	23%	1	9	69.2%
Otalgia.....	19	11	58%	1	7	36.8%
Snoring.....	68	54	78.5%	7	7	10.3%
Speech defect.....	30	4	13.3%	19	7	23.3%
Rheumatic pains.....	12	2	16.6%	7	3	25%
Nocturnal enuresis.....	3	1	33.3%	2	—	—

Walker³⁰ went to the parents for opinion as to the relative success or failure of adenotonsillectomy. In this series two very essential basic principles were insisted upon. First, the patients were carefully selected for operation, the majority being referred for surgery after evaluation by the pediatrician, and the pediatrician was an equal partner in the

prediction of good results. Second, good surgical technique as well was insisted upon.

Six sets of questions were sent out:

1. Was the operation beneficial from the standpoint of *a*. Increased resistance to infection. *b*. General well-being. *c*. Improved appetite.

A favorable response was given in 83 per cent. Some of the questions were unanswered, but even if these responses had been unfavorable an over-all percentage of favorable answers would have been 72 per cent.

2. Since surgery is any difference noted in: *a*. Number of common colds. *b*. Severity of common colds. *c*. Duration of common colds.

Answers showed that 70 per cent of operated children withstood this infection more readily. Unanswered questions, even if unfavorable, would reduce this by only 5 per cent.

3. If any of the following conditions was present before surgery please indicate the appropriate answer: *a*. Mouth breathing. *b*. Swollen neck glands. *c*. Noisy breathing at night. *d*. Restlessness at night. *e*. Constant nasal discharge in winter or year round. *f*. Cough.

Of this group of answers 89 per cent were relieved by surgery.

4. If hearing impairment was one of the indications for surgery is hearing now: *a*. Normal. *b*. Improved. *c*. Unimproved. *d*. Worse.

The answers indicated that 25 out of 28 cases were improved.

5. *a*. Was your child subject to ear pain before surgery? Was your child subject to ear infections with discharge?

Complete relief of otalgia was experienced in 34 out of 45 children and relief of discharge in 14 out of 22.

b. If the patient continued to have post-operative pain or discharge was there any difference noted in 1. The frequency of pain or discharge; 2. Severity of pain or discharge; 3. Duration of pain or discharge.

The answers to these questions indicated that practically all in this group were less likely to have severe symptoms.

6. a. From a psychological standpoint do you think your child was emotionally upset by his or her hospital and surgical experience?

Out of a total of 95 answers 59 reported no effect, 24 slight effect, 7 moderate and 5 severe. Analysis of these answers indicate that the presence of parents seems to be of value in preventing psychological trauma. Of interest was one child who had both T.&A. and circumcision and suffered severe emotional trauma while his brother, who had previously undergone only the tonsil operation, was not affected. The attitude of the parents is most important. Extremely tense attitudes on the part of the parents is likely to lead to more emotional upset in the child.

b. In reference to emotional trauma do you feel that this reaction was temporary or permanent?

The answers were that reaction was permanent in three, temporary in 31 and unspecified in two out of a total of 36.

Comment: The over-all favorable results recorded in this summary are mainly attributable to proper selection of cases and good surgical technique. The selection of patients for T.&A. is much better done by the pediatrician or family doctor who is associated with the child over a period of time than by the specialist who may be consulted only once or twice at times when the upper respiratory tract is relatively full of infection.

Kenton and Parsons³¹ report a new technique for anesthesia for tonsillectomy which they have used successfully on about 1,400 children, the vast majority of whom were under 10 years of age.

No mortality or morbidity occurred that could conceivably be connected with the method of anesthesia employed.

Premedication plays an important part in the success of the method, and, therefore, accuracy in its application is insisted upon. Children between four and nine years (assuming their weight to be broadly within normal limits) one hour before operation, receive $1\frac{1}{2}$ gr. (0.1 g.) of quinalbarbitone ("Seconal") and 10-15 mg. of pethidine, with $1/150$ gr. (0.43 mg.) of atropine by injection. Those between the age of 10 and 18 years are given 3 gr. (0.2 g.) of quinalbarbitone and 15-25 mg. of pethidine, with $1/200$ gr. (0.32 mg.) of atropine. Pethidine for children is thus given at approximately 3-3.5 mg. per stone (0.47-0.55 mg. per kg.) of body weight. The well-established analgesic and antispasmodic action of pethidine when combined with the hypnotic effect of quinalbarbitone makes the induction of anesthesia by means of the sequence of inhalational agents (nitrous oxide with oxygen-trilene-ether) rapid and smooth.

With the above premedication, patients arrive in the theater fast asleep, and with judicious induction, pass from sleep, without waking up, into anesthesia within a matter of two minutes. Those who arrive in the theater conscious but drowsy are not apprehensive and readily co-operate in "blowing up the red balloon."

Induction is achieved by allowing nitrous oxide to flow at the rate of 10 litres a minutes without the mask touching the face. Sense of smell is lost in two or three breaths, and a trickle of "trilene" is added. The mask is then lowered to the face and nitrous oxide is adjusted to 6 litres, and oxygen, 2 litres, is added, the child remaining pink throughout. The expiratory valve is closed and the bag emptied two or three times to eliminate some of the lung nitrogen. Three breaths later an oral airway is introduced at the slightest suggestion of obstructed airway, and is surprisingly well tolerated; a trace of ether is then added to the mixture. The expiratory valve is now slightly opened, and the bag is very gently compressed, assisting respiration. The patient is now wheeled into the theater, and while he is being placed on the table (with-

head-down tilt of about 5 degrees) and the towels are being draped in the thyroid position the ether is allowed to flow more freely; at no time need the gases bubble through the ether.

It will be found that the lower jaw is sufficiently relaxed for the Davis gag to be placed in position. The harness is not used, the gag being supported manually.

Experience has taught us that the above technique provides adequate anesthesia for tonsillectomy and adenoidectomy in children up to the age of 10.

In children of 10 years and over greater concentration of agent or agents employed and/or intubation would be necessary to achieve the same purpose. Instead of resorting to either of the above means, we find it advantageous to cut off the access of traumatic stimuli, leaving the plane of general anesthesia light; therefore in older children the method is combined with infiltration of the vicinity of the tonsil with 1 per cent lignocaine hydrochloride without adrenaline.

A research team at Albany Medical College, Albany, New York³² tried to ascertain whether careful preparation and handling would reduce the emotional injury sometimes experienced by children admitted to the hospital for tonsillectomy. There were 140 children, aged three to eight in the experiment, and the key people in preparing them to face operation confidently proved to be the social worker and the anesthetist. Both of these went to unusual pains and spent a great deal of time to achieve their object. Premedication was slight or not used at all. It was found that rectal temperature taking was alarming, and so, of course, were enemas. Both were given up. Injections were avoided, except for an injection of atropine just before operation, and a needle-prick for hemoglobin estimation.

The social visitor visited the child at his home ten days after the operation, and again two or three months later, to see whether he was showing any evidence of increased anxiety. She estimated that, of the 140, 30 showed favorable behavior changes. The children treated with consideration for

emotional factors gave less evidence of trauma than those who were not. More than half of the 140 showed behavior that was either unchanged or improved. The younger children in the series showed more but milder adverse behavior traits than their seniors.

Over an 18-month period, Eckenhoff³³ sent questionnaires to parents of children who had otolaryngological operations, in an attempt to find out the possible relationship between anesthesia and personality changes. The answers sought were: — 1. Is your child a bed-wetter; since operation does he wet the bed or wet it more frequently? 2. Does your child have night cries or terrors; since operation does he have night terrors or have them more frequently? 3. Is your child subject to temper tantrums; since operation do they occur or occur more frequently? 4. Has your child become afraid of meeting strangers since operation? 5. Has your child been afraid to have his face covered since operation? 6. Has your child become afraid of new odors since operation? 7. How did you prepare your child for hospitalization and operation?

Replies were received from 612 or 61 per cent of the total questionnaires sent out. Seventeen per cent of the replies indicated a personality change which might be traced to anesthesia or hospital experience. The younger the child, the more likelihood there was for the development of personality changes. Premedication, when properly administered, and careful and proper induction of anesthesia lessened the chances of personality changes. It was found that bed-wetting occurs five times more commonly after the use of vinyl ether (Vin ethene) than when other techniques were used.

POLIOMYELITIS AND TONSILLECTOMY.

Lassen and Ibsen³⁴ gave a first-hand account of the 1952 outbreak of poliomyelitis in Copenhagen. Most of their report concerned the tremendous treatment problem which was tackled at the Blegdam Hospital, where in less than six months over 300 patients were admitted in need of special measures, such as tracheotomy and assisted respiration, by reason of bulbar or other paralysis.

In the course of this outbreak 2,722 cases of poliomyelitis were notified from among a population of approximately 1,200,000. Epidemiological investigation led to the conclusion that personal contact is an important factor in the spread of poliomyelitis.

Southcott, who has made a retrospective survey of the 1947-1948 outbreak in South Australia, finds that in 35 out of 39 cases of bulbar poliomyelitis, the patient had been tonsillectomised. This was a higher proportion than might have been expected from a random group. In only one of the bulbar cases, however, had the operation been done during the current period of prevalence; and in over half these cases tonsillectomy had preceded poliomyelitis by more than five years. Nevertheless, Southcott believes on statistical grounds that the two events were associated, and that a child whose tonsils are removed at the usual age of five to seven years, suffers trauma to the nerves of the pharynx which increases susceptibility to bulbar poliomyelitis (but not to other forms) for at least ten years.

If this finding is confirmed we shall have to regard poliomyelitis as a long-term as well as a short-term risk after tonsillectomy; and the indications for this very common operation may have to be revised. Lassen did not say whether the epidemiological investigation of the Copenhagen outbreak had been designed to examine the possible long-term association of tonsillectomy with bulbar poliomyelitis. The number of such cases surveyed by the Danish workers must be among the largest ever studied in a single locality; and this Danish outbreak seems to offer an excellent opportunity for confirming Southcott's findings in Australia.

Tolczynski³⁵ reviews the controversial tonsillectomy — poliomyelitis relationship by attempting to answer five important questions. For the answers he surveyed the literature and tabulated the information obtained during the severe poliomyelitis outbreak in Saskatchewan in 1952.

Question No. 1. Is the part played by tonsillectomy such as to suggest that this question increases the risk of contracting

poliomyelitis? There is no unanimity of opinion on this question. Some papers would indicate that the risk is two to three times as great in the recently tonsillectomized patient. While others show that the relationship is only casual. One author was able to prove that the annual incidence of poliomyelitis in the general population is 30 times greater than in the recently tonsillectomized patients during an epidemic.

Question No. 2. Does recent tonsillectomy increase the danger of developing bulbar type of poliomyelitis? Again there was widespread disagreement with one author contending that the idea of any relationship existing belongs to the past. Others felt that the likelihood of bulbar poliomyelitis was 16 times as great in the recently tonsillectomized patient as in the general population. The preponderance of statistics would suggest, however, that in over 50 per cent of recently tonsillectomized patients who contract poliomyelitis, it will be of the bulbar type.

Question No. 3. Does the presence or absence of tonsils and adenoids influence the susceptibility to poliomyelitis, the type and the mortality of the disease? Here again there was much difference of opinion. Many authors feel that the tonsils and adenoids are a barrier to the virus and that without them patients are more susceptible to poliomyelitis and are more likely to develop the bulbar type. At the other end of the scale was a report of the 1916 epidemic in New York where there were 8,928 cases and 2,407 deaths. This report states that the disease was rare among tonsillectomized patients and affected mostly children with hypertrophied tonsils and adenoids.

Question No. 4. Should the discontinuation of the T. and A. operation be recommended during the summer months. What time then should be the proper one? Is tonsillectomy an elective operation which can be postponed indefinitely?

Most authors feel that T. and A. operations should be suspended during the summer months and especially if there is an epidemic of poliomyelitis in progress, but in certain cases where the indications are urgent the surgeon must decide

whether the risk of contracting poliomyelitis is as great as the danger of delaying operation.

Question No. 5. Can a simple answer be given to the problem of polio-tonsillectomy relationship?

From his review of the literature on this question, he feels that the answer is no. There is no conclusive evidence for or against the relationship; but, because of the education of the public in respect to the danger and because tonsillectomy may precipitate poliomyelitis in children who are healthy carriers, the operation should be avoided during time of increased exposure to the virus.

Comment:

This is an interesting paper which shows the wide variation of opinions on the subject. It also shows how statistics can be found to support either extreme.

Whether or not there is some specific relationship between T. and A. and poliomyelitis it would seem wise to avoid any elective operation during an epidemic of poliomyelitis because the patient's general resistance to infection may be lowered by any operation to a degree that would render him more susceptible to an attack of poliomyelitis.

MOUTH AND THROAT INFECTIONS.

Because primary faucial diphtheria is rare during the neonatal period, Curtin³⁶ published a report of such a case in an infant — aged 22 days. The infant was breast fed and progressed normally until he reached the age of 20 days. At this time he became increasingly lethargic and refused to take the breast. He was pale and apathetic and had a weak cry. A gray membrane covered the left tonsil and extended backwards over the posterior pillar and also encroached upon the anterior pillar. The membrane was adherent to the underlying tissues and bled on swabbing. There was no nasal discharge. The temperature was 97.8° F. A diagnosis of diphtheria was made and 20,000 units of antitoxin were given pending the bacteriological confirmation. The report next day

was *C. diphtheriae* and it was found to be a virulent type. The infant was admitted to hospital and a further 40,000 units of antitoxin given along with 500,000 units of penicillin. This was followed by 100,000 units of penicillin four-hourly. On the third day the infant collapsed due to vascular failure and was revived with difficulty. Two days later palatal paralysis with nasal regurgitation developed, and it was necessary to give esophageal feedings for three weeks. The infant was eventually discharged well after 164 days in the hospital.

It has long been recognized that a mother transmits diphtheria anti-toxin to her infant, but this protection may rapidly be lost. It has been suggested that the rarity of faucial diphtheria is due to the acid reaction of the mouth and the poor development of the tonsils in infancy.

The explanation in this case of faucial diphtheria was that the 14-year-old brother was a carrier of virulent gravis-type organisms. He prepared a feed of sugar and water two days before the baby fell ill, and before offering the bottle to the infant he sucked the nipple to satisfy himself that the contents were satisfactory. His own carrier state did not clear on intensive penicillin treatment but eventually disappeared following tonsillectomy.

Lall and Karelitz²⁷ from the Willard Parker Hospital in New York discuss the treatment of diphtheria and six diphtheria carriers with terramycin. Six cases of acute faucial diphtheria and six diphtheria carriers were studied. All cases were given 50 mgm. of terramycin per kilo per day. Those acutely ill with diphtheria were also given antitoxin shortly after admission to the hospital. The contact carriers were given the terramycin alone. Terramycin was given in all cases until three negative nose and throat cultures were obtained.

Of the six cases of acute diphtheria one had negative nose and throat cultures in three days. Four had negative swabs within 24 hours and one required seven days to become negative. This is an average of 2.33 days as compared with an average of 21 days previously reported in cases who had anti-

toxin alone, and an average of five days in aureomycin treated patients. All had membranes which lasted five or six days, and all had virulent strains of *C. diphtheriae*. No secondary infections due to fungus or bacterial invasion occurred, and no neurological or cardiac complications developed.

The results in the carrier cases were about the same as in the acute cases. The carrier state was considerably shortened. Two patients had negative nose and throat cultures within 24 hours. One had negative cultures after two days, one after three days, one after four days and one after six days.

The impression gained from this work and previous contributions by the authors was that for acute faucial diphtheria, results differ very little whether penicillin, aureomycin or terramycin is added to the anti-toxin therapy. The carrier state can be terminated by penicillin, aureomycin or terramycin in most patients. Terramycin may be given to patients who are allergic to penicillin or who harbor bacterial strains resistant to penicillin.

The condition of recurrent parotid swelling has been defined as a clinical entity by Jones.³⁸ Most of the published accounts refer to adults, but the disease is by no means rare in children. Seventeen cases are reported from the Midlands of England.

The essential feature of the condition is the swelling of one or both parotid glands. This recurs once or many times. In these cases recorded the whole parotid gland had been enlarged, and there was usually tenderness but no redness or edema of the overlying skin. Swelling had lasted from a few minutes to several weeks, and pain had been a variable feature. Usually there was some discomfort present. When the disease was active, muco-purulent secretion could nearly always be expressed from the affected gland. The temperature was inconsistent and was often normal. The white blood count was usually 8,000 to 10,000 but in one case went up to 24,800. In most of these cases the sialogram confirmed the diagnosis. A plain film was first taken to exclude the presence of calculus which was never found. One to 2 ml. of "Neohydinal fluid" was injected with a syringe and small blunted hypo-

dermic needle into Stenson's Duct, and lateral and postero-anterior projections were made. In the normal gland the ducts were well outlined, and it proved impossible to avoid filling of the acini. In 10 patients of this series a spherical dilatation of the finer ducts was seen, and in others a more distinctive change occurred. In only one case was the sialogram normal.

The organisms cultured from the parotid secretion were α hemolytic streptococcus, or pneumococcus, or both. The condition is thought to be due to infection in the mouth such as carious teeth and infected tonsils, or in the nasopharynx. The infection ascends the parotid duct and is associated with the stagnation of the secretion in the gland.

Treatment consisted of massage of the gland together with the local injection into Stenson's Duct of penicillin. Penicillin 100,000 units per ml. were injected daily for six days. In some cases a second course of treatment was given after an interval of several months. This treatment commonly cut the period of activity of the disease and sometimes caused complete relief.

CONGENITAL ABNORMALITIES.

In a paper on congenital choanal atresia Baker²⁰ found in the literature some evidence of familial tendency; also that the condition is more frequent in the female, and that 90 per cent are osseous and 10 per cent membranous. In respect to the latter figures, other investigators have found quite a fair number of mixed osseous and membranous atresias. In two-thirds or more of the cases the obstruction is unilateral.

Embryological theories as to cause are — 1. Persistent bucconasal membrane. 2. Persistence of buccopharyngeal membrane. 3. Or medial outgrowth of the vertical and horizontal processes of the palate bone. ,

Clinically this condition should be suspected in all cases of asphyxia neonatorum, especially if the infant has repeated attacks of cyanosis or suffocation which are definitely relieved by coughing and aggravated by nursing or sleeping.

Diagnosis can be made by failure of a probe to pass into the nasopharynx, or in older patients additional help may be obtained by X-ray, using lipiodol. There is always a considerable amount of thick glistening mucus on the floor of the nose.

Surgical correction has been done intranasally, trans-septally, transantrally, and also by the transpalatine approach.

He feels that, while the intranasal approach is successful, it is not too satisfactory, because it requires a great deal of time and aftercare on the part of the surgeon and brings considerable discomfort to the patient. The transpalatine procedure will possibly be the operation of choice in the future.

Ersner⁴⁰ reported a case of bilateral bony choanal obstruction in an eight-year-old girl, which he treated by removal of the bony obstruction by operation through the nose. The openings were kept patent by inserting a No. 26 French catheter in the form of a rubber doughnut. This was changed to a No. 22 after three weeks, and the latter was left in until 48 days post-operatively. Thereafter there was no tendency to close, and the nasal respiration was perfect. It was interesting that, with establishment of air currents through the nose, the child was able to smell things and taste her food for the first time.

Bilateral choanal atresia must be included in the differential diagnoses of all cases of asphyxia neonatorum.

He suggests that, when adenoids are removed, some form of nasal sound should be passed to ascertain patency. He has discovered five previously unsuspected unilateral choanal obstructions with this routine.

The Treacher Collins' Syndrome is constituted by the following congenital abnormalities.

1. Bilateral notchings of the lower eyelids.
2. Deficiency of the malar bone and infra-orbital ridge.
3. Lack of cilia on the medial third of the lower lids, with oblique palpebral fissures.

4. Micrognathia.
5. Bilateral deformities of the ears.
6. Absence of the puncta of the lower eyelids.

They mention also several less frequently occurring congenital defects, the most important of which are:

7. Nasal deformities.
8. Malocclusion.
9. Absence of the external auditory meatus with degrees of deafness.
10. Cleft lip and palate.
11. Deformities of the extremities.

McNeill and Wynter-Wedderburn⁴¹ described a three-months-old child who had a number of the above deformities and in addition bilateral choanal atresia. Illustrated by four photographs.

Finerman and Pick⁴² discuss the problem of nasal encephalomeningocele. There are three main groups. Occipital—these are the most common. Sincipital—externally visible tumors of the nose or forehead or the medial corner of the eye or anterior part of the orbital cavity. Basal herniations are not externally visible and can be subdivided according to whether they come —

1. Through the sphenoid bone or between the sphenoid and the ethmoid when they are referred to as Encephalomeningocele Spheno-Pharyngea.

2. Through the cribriform plate to produce an intranasal tumor.

3. Through the supraorbital fissure into the orbit behind the eyeball.

4. Through the supraorbital fissure and on down via the infraorbital fissure into the sphenomaxillary fossa producing a tumor on the medial side of the mandibular ramus.

In one report of 49 cases of intranasal encephalomeningocele only 20 cases survived treatment. Most succumbed following surgery from immediate meningitis or later meningitis due to an upper respiratory infection.

Inclusion of encephalomeningocele in the differential diagnosis of intranasal tumors is, therefore, more than academic. The following are some diagnostic criteria: —

1. A nasal tumor found at birth or symptoms of nasal obstruction found in early childhood.
2. A widened nasal root or unusually large pupillary distance.
3. The presence simultaneously of an external encephalomeningocele.
4. A tumor arising high in the nose over which the septal mucous membrane appears to continue.
5. Evidence of intracranial communication such as fluctuation synchronous with the pulse or respiration.
6. Post-operative cerebro-spinal rhinorrhea.

X-ray is of little aid even with defects up to one centimeter in diameter. Diagnostic puncture or biopsy are dangerous. The best diagnostic aid is to suspect the possibility of such an anomaly.

Dolowitz, Rambo and Stephens⁴³ report a study of family in which hereditary hemorrhagic telangiectasia has occurred in the past six generations. Eighty-three cases occurred out of 491 members reported on. The disease behaves as a Mendelian dominant. Pathologic changes are confined to the blood vessels and the effects of hemorrhage. The basic lesion is a greatly dilated endothelial space which is deficient in elastic and muscular components. Although attention is usually centered on local manifestations careful search may show the lesions to be widespread.

Attempts to prevent hemorrhages have been most unsatisfactory, because, although it is easy to destroy the primary

lesion by cautery, X-ray or some other method, satellite lesions soon form several millimeters away; therefore, control of hemorrhage is about all one can do, and in this regard the excessive fragility of the telangiectatic vessels must be recognized. Oxycel or gelfoam or similar topical hemostatic agents are the best methods because these materials do not require removal. The clot, therefore, is not disturbed and secondary hemorrhage is frequently averted.

SURGERY.

Jordan⁴⁴ has written on the importance of early diagnosis and treatment of nasal fractures.

Rather than wait until swelling has subsided by natural means, the edema can be dispelled immediately by the injection of hyaluronidase into the tissues. This is a specific enzyme which hydrolyzes the intercellular cement known as hyaluronic acid with the resulting hastened diffusion of tissue fluids.

He uses mainly local anesthesia in adults and uses the usual intranasal cocaine and adrenalin plus injections of a solution made up in the following proportions: 150 units hyaluronidase and 0.5 cc. of 1:1,000 adrenalin to 25 cc. of one per cent procaine. He recommends similar measures in children with the addition of general inhalation anesthesia.

He describes his methods of treating nasal fractures and points out that open reduction is often advisable by the rhino-plastic methods of Foman. Such open reduction has the advantage of: 1. Accurate diagnosis by inspection. 2. Evacuation of hematoma and better drainage. 3. Precise reduction under direct vision. 4. Correction of pre-existing defects. 5. Attention to associated fractures. 6. The lessening danger of post-operative deformities and impairment of function.

Following reduction adequate intranasal packing and a rigid external dressing help to maintain position. With continuous protection of antibiotics the packing can be left in as long as seven days.

Cottle, Quilty and Buckingham⁴⁵ present some of their experiences with different types of material in the attempt to improve the appearance and restore the function of variously deformed noses.

The most specific needs for implants in children are: 1. The restoration of contour of the roof, especially over the cartilage vault; 2. The stretching of the skin in this area in preparation for future permanent correction; 3. The prevention of subcutaneous cicatrix formation in the dorsum region and, 4. The repair of septum deformities and defects.

For all of these they have used preserved human and ox cartilage with about equal results. Ten to 20 per cent absorption of the grafts is to be expected . . . Small implants of plastics and ivory are remarkably well tolerated. To obtain good-sized straight non-curling slices of cartilage, we used the crest of the ilium in children. In the very young the iliac crest is cartilaginous — not cancellous and cortical bone, and slices are easily obtained without endangering the future growth of the pelvis. The fate of this cartilage is no surer or different from other autogenous or preserved cartilage. It is as readily absorbable, but they have never seen it start an appreciable local reaction.

The care of hematoma and abscesses of the septum especially in children requires special attention.

Following the usual drainage instituted in such cases a careful inspection of the septum must be made to determine the extent of the septal cartilage destruction. It will often be learned that much if not all of this quadrilateral cartilage has disappeared and perhaps, too, the upper lateral cartilages are involved. This leads to saddling of the cartilaginous vault, retraction of the columella and deformities of the upper lateral cartilages, and the nasal lobule. Replacement of the missing cartilage must be made.

Autogenous cartilage from the ribs, ears, or crest of the ilium can be used. In their experience all of these as well as all other substances are very likely to be absorbed or extruded.

They feel that following an abscess or hematoma the septal tissues are not ready to receive implants for many months, but at the same time if they allow healing to proceed unhindered the fusion of the two mucosal flaps will become so firm with solid scar formation that subsequent separation will be impossible; therefore, they recommend that at about 8 to 12 weeks following subsidence of the acute infection some material be placed between the flaps even though the benefit may not be permanent. For this they have used autogenous or preserved cartilage. Not one was permanently retained; however, one to two years later they have been able, in all of their patients, to find a plane of separation and have then reinserted the implants. The value of ox cartilage in these instances has been most noteworthy. One of their ivory implants in an adolescent septum is still intact after 13 years.

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FIFTY-SECOND CONGRESS FRANCAIS d'OTO-RHINO-LARYNGOLOGIE.

The 52nd Congrès Français d'Oto-rhino-laryngologie will meet October 18 to 22 in the Grand Amphithéâtre of the Faculté de Médecine, Paris, under the presidency of Professeur J. Terracol, of Paris, and honorary president Professeur Léon Binet, member of the Institut, Doyen of the Faculté of Médecine of Paris. A number of interesting papers will be given, among them, "La Thérapeutique par les ultra sons en Oto-rhino-laryngologie," by Professeur Portmann, with MM. Michel Portmann and Louis Barbe, as collaborators; "De la greffe cutanée libre en chirurgie otologique," by MM. Ombrédanne, Clerc, and Poncet.

LATERAL PHARYNGEAL SPACE DISSECTION AS AN ADJUNCT IN RECONSTRUCTING THE MUSCULAR VELOPHARYNX.*

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One of the most controversial surgical problems of all time is the reconstructive management of clefts of the muscular velopharynx. As the investigator plods through the voluminous literature on this subject and listens to innumerable contradictory dissertations regarding it, he is likely to reach a state of total confusion. Perhaps the simplest method of re-orienting himself is to review the historical panorama of surgical exercises and to pick out in chronological order those which have the most practical application. To assist in this endeavor we feel that he should lean heavily on the splendid research done during the past two decades.

HISTORY.

Though Albuscasis of Arabia wrote on deformities of the mouth as early as the eleventh century,¹ medical literature contains no clear reference to the congenitally cleft velum prior to 1739, when Sharp casually mentioned that it was relatively common to find "the roof of the mouth fissured."² A French dentist, Le Monnier, was first to report a successful repair,³ and it was not until the nineteenth century that surgical cognizance was taken of this malformation.⁴ In 1816 von Graef described an effective surgical operation,⁵ but it remained for Roux to popularize staphylorrhaphy as the result of a much-publicized operation on a Canadian student.⁶ This event marked the beginning of a long period of surgical experimentation.

The cleft velum presents the surgeon with an unusually complex problem. Closure must be accomplished and physi-

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ological function must be established in such a manner that normal growth patterns are not thrown out of balance, and the face may continue to develop in proper proportion. Closure itself absorbed all the attention of the early workers. No effective knowledge of regional anatomy, or of the physiology of speech, existed to govern approach to a solution; therefore, it is not surprising that while some of the procedures advocated were merely variants of one another, others were diametrically opposed.

Almost from the beginning there was recognition of a need to counteract the lateral muscle pull that interfered with healing after staphylorrhaphy. Different kinds of metal sutures were used and several types of relaxing incisions were attempted. Froriep, in 1823, was first to sever the palatal muscles, and ten years later Dieffenbach also advocated cutting these muscles to obtain relaxation.⁷ Incisions for that purpose then came into frequent use. Such incisions divided various muscles, as dictated wholly by chance, until in 1844, when Fergusson was able to present a careful dissection of the muscles of the cleft velum and a classic description of their function.⁸ Fergusson himself practiced myotomy, with successful closure in 129 of the 134 cases he operated on between the years 1828 and 1864.⁹ His method, or a modification thereof, was popular for a generation. Seeking a more satisfactory method of relieving tension, Billroth in 1861 suggested fracture of the hamular processes, and later vigorously deplored myotomy because of its resultant scarring and immobilization.¹⁰

In the meantime, another important forward step had been taken. Von Langenbeck observed bone regeneration in a resected maxilla with intact periosteum, and was thereby motivated to use the palatal periosteum in flaps mesially displaced from each side of the split palate.¹¹ In this manner the blood supply to the flaps was theoretically assured, and a second basic cause of failure in closure was thought to be overcome. Later von Langenbeck greatly refined his procedure, utilizing the best features of each of the several methods previously employed.* The success of his efforts earned for him the

* Dorrance calls him "the codifier of cleft palate surgery" (loc. cit., 9).

honor of being both approved and imitated by his contemporaries.

During the latter part of the nineteenth century, knowledge and practice had so far advanced that successful closure was generally achieved by the skilled surgeon; however, Passavant in 1862 called attention to the nasal twang resulting from palate repair, and attempted several means of improving functional results.¹² Fergusson and others then turned their efforts toward that goal, but there was still no clear understanding of the intricacies of the problem.

The first detailed account of the speech defects associated with clefts of the palatopharyngeal sphincter was written by J. A. Bond in 1893.¹³ He emphasized that patients suffering from such a congenital malformation should have speech training subsequent to operation. Sir James Berry was probably the first surgeon to publish a detailed analysis of the speech results in a series of repairs.¹⁴ Thereafter, attention was concentrated on speech improvement, and great strides were taken by the early twentieth century surgeons toward obtaining better functional results. Ganzer,¹⁵ Veau,¹⁶ Dorrance,¹⁷ Turner,¹⁸ and Wardill¹⁹ were the leaders in this surgical endeavor. Morley's excellent treatise carried this work much further,²⁰ and there is promise of additional development when the photographic research done by Kemper and colleagues is published.*

Slowest to yield to advancing surgical knowledge was the problem of maintaining proportional development of the face after palate repair. Bone growth studies had been made by Sir John Hunter with a series of madder feeding experiments late in the eighteenth century but were not yet correlated with the surgical problem of reconstructing the split palate.²¹ Ernst was perhaps first to appreciate their importance in that respect. Anticipating later studies, in 1926 he wrote:

"Each early operation has the effect of retarding the development of the jaw of the child, because the vital forces do not stand in proportion to those created by sur-

* Personal conversation with John W. Kemper, Sept., 1949.

gical intervention, such as the suture, the resulting scar, and scar tissue."

His investigations led him to conclude that in patients with clefts of the velopharynx, the mesopharynx is wider than in those without the malformation and that the halves of the maxillae are not normal in size, but smaller. He added:

"If one strives to eliminate obturators, then a circular narrowing of the pharynx is required to such an extent that the function of the muscles is sufficient to close the opening between the nose and mouth. In most cases, such a narrowing of the pharynx is sufficient."

Ernst also wrote of the retroposing technique which Ganzer had described in 1917.²²

Ernst's recognition that the mesopharynx in this malformation is widened in both the anteroposterior and the lateral diameters and that the musculature of the palatopharynx must be re-assembled into a position where it can function physiologically, should have played a most important part in all subsequent plans of surgical attack.

It is the purpose of this paper to review the anatomy of the region, to point out a natural anatomical route to the cleft velum, and to describe a procedure whereby the maximum physiological function can be obtained with minimum trauma and minimum interference with the growth processes.*

In our hands, use of this method has been responsible for more normal growth patterns of the face, and for a considerable improvement in the physiological function of phonation, in a series of 120 cases operated on since 1945. Ages of patients in this series have ranged from three and one-half years to 50 years.

ANATOMY.

The palatopharyngeal muscular mechanism is an extremely intricate one, so intricate that students of speech production

* A 26-minute sound and color film, including both pre- and post-operative speech recordings and complete operative procedure, is available upon request.

are still baffled by some of its more complicated patterns. One readily recognizes its complexity upon stroboscopic examination of this highly-integrated muscle group; therefore, a profound responsibility is placed upon the surgeon who attempts the task of rebuilding its essential elements into such a physical state that they will perform as normally as possible. This objective is not attained by the mere assembling of the inert tissues of the palate to form an inactive diaphragm between the mouth and the nose; it is accomplished only by a direct surgical approach to the essential muscular structures that comprise the palatopharyngeal sphincter in its entirety.

Fortunately for the surgeon, the muscle groups which make up the normal velum and those of the split velum are essentially the same. This is also true of the nerve and blood supply. However, the split velum presents two congenital anomalies which make the difference between good speech production and the distorted patterns associated with clefts of the velum: first, a widened bony and muscular pharyngeal vault containing two separate anatomical entities which cannot act physiologically until built into one single mechanism, a palatopharyngeal sphincter; second, degenerative changes, including atrophy and hypoplasia, of all or part of the soft tissues and skeletal structures comprising the palatovelar architecture. These changes begin when the halves of the palate fail to unite in intra-uterine life and continue because of distorted physiology. Only by surgical rehabilitation can these processes be halted.

The musculature of the palatopharyngeal sphincter, together with its nerve supply, lies within the dome of the pharyngeal tube. With the exception of the tensors, the sphincter is almost completely enveloped by two of its most important components: the superior constrictors of the pharynx. In enumerating its anatomical boundaries one has only to outline those of the superior constrictors (see Fig. 1). Above, the constrictors are literally hung from the base of the skull (see Fig. 2). They are bounded laterally by the pharyngomaxillary fossae, or lateral pharyngeal spaces (see Fig. 3). Their points of origin include the posterior border of the hor-

Horizontal section through head at level of angle of lips demonstrating anatomical relation of superior constrictor of pharynx and surrounding lateral pharyngeal space. (right)

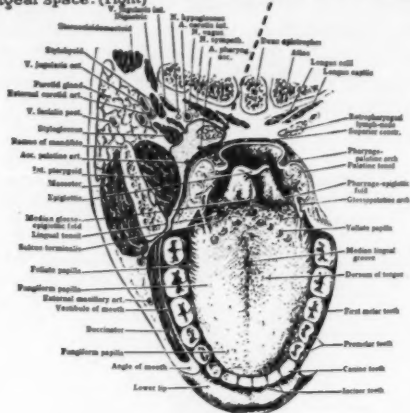
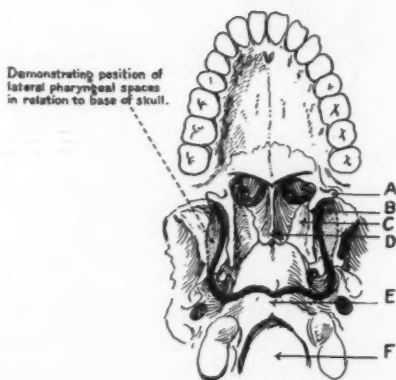


Fig. 1.



The heavy line shows the attachment of the fascia pharyngobasilaris to the base of the skull. A, Indicates the hamular process; B, pterygoid plate; C, sphenoid bone; D, vomer; E, occipital bone; F, foramen magnum.

Fig. 2.

horizontal plate of the palatine bones, the lower third of the medial pterygoid plates and their hamulae, the pterygomandibular ligaments, the alveolar processes of the mandible, and fibers from each side of the tongue.

Because of the anatomical architecture of the pharynx, it is readily seen that by freeing the superior constrictors from their bony ligamentous, and musculo-fascial attachments and by dissecting free their surrounding lateral pharyngeal spaces, complete mobilization of the muscular components of the velopharyngeal sphincter may be attained.

Demonstration of lateral and postero-lateral aspect of right lateral pharyngeal space to muscles of velopharynx.

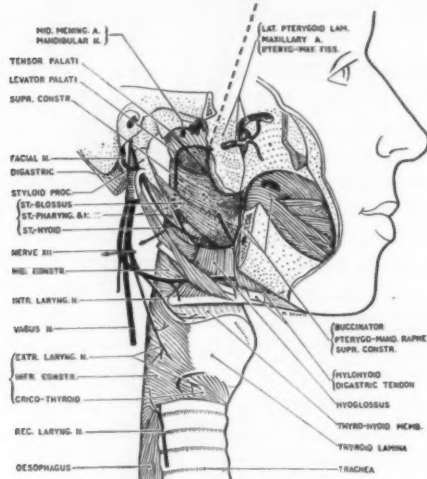
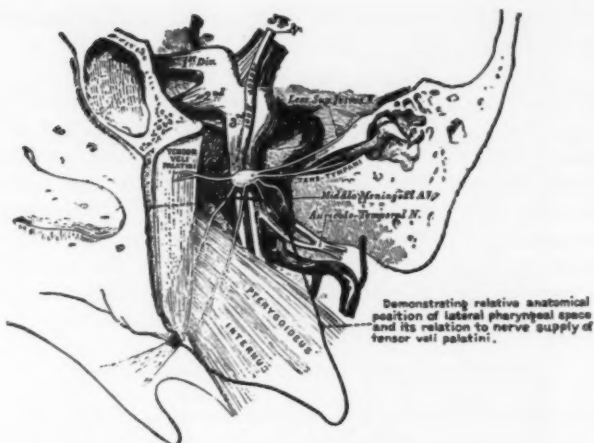


Fig. 3.

The entry to either lateral pharyngeal space is made by splitting one of the most important ligamentous suspensory attachments of the velum, namely, the pterygomandibular raphe. Once this is done, the antero-superior aspect of the lateral pharyngeal space lies open so that the rest of the space can be ablated by blunt dissection. By this method the nerve supply to the tensor, which enters that muscle in its upper third, is not cut or even traumatized (see Fig. 4). The same may be said of the motor innervation of the remaining muscles of the velum. Fig. 5 demonstrates the exit of the glosso-pharyngeal, vagus, and accessory nerves from the carotid



The otic ganglion and its branches.

Fig. 4.

Demonstrating posterior dimension of lateral pharyngeal space, showing its relation to motor nerve supply of muscles of velopharynx.

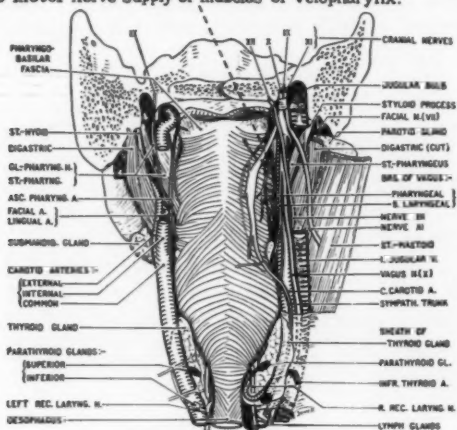


Fig. 5.

sheath, high in the neck and posterior to the lateral pharyngeal spaces. Careful dissection eliminates any possibility of

interfering with the function of these nerve elements which make up the pharyngeal plexus.

In dissecting the lateral pharyngeal spaces one should keep in mind that the blood supply in this area is composed of two vessels: One is the ascending palatine artery, which traverses vertically upward over the superior constrictor and occupies an anterior position in the fossa. The other is the ascending pharyngeal, which lies over the muscle and is also vertically directed upward, but in a posterior position. In our experience, careful manipulation of the tissues prevents damage to these vessels and thereby obviates excessive bleeding.

AGE OF PATIENT AND TYPE OF ANESTHETIC.

Candidates are preferably between the ages of four and one-half and six years. In our opinion, all of the deciduous teeth should have erupted and the bite be well established before surgery takes place. In some instances we delay until the six-year molars have begun to erupt. By following this pattern of attack we are more nearly certain that any surgical interference about the pterygoid abutments will not tend to retard or stop further growth processes about the mid-third of the face.

Having determined that the patient is physically fit for surgery, either hypopharyngeal ether insufflation or an endotracheal anesthetic is administered. In addition we have routinely used a local anesthetic, composed of one per cent novocaine with 20 drops of adrenalin to the ounce, to infiltrate the soft tissues of the hard palate and the lateral pharyngeal spaces. The use of this local anesthetic accomplishes a dual purpose: it allows the anesthetist to carry the patient in a lighter plane of anesthesia, and by providing a dried field it assists the surgeon to perform lateral pharyngeal space dissection with greater ease.

SURGICAL PROCEDURE.

Fig. 6 demonstrates the lines of incision chosen for the surgical dissection. The tissues of the hard palate are elevated in their anterior extremity and the dissection is continued in



FIG. 6.



FIG. 7.

a posterior direction. After identifying the greater palatine vessels, the dissection is extended posteriorly until the pterygoid hamulus is exposed and severed. If at this point the pterygomandibular ligament is split from before backwards,

the dome of the pharyngomaxillary fossa, or lateral pharyngeal space, will be opened, and easy access may be gained to perform blunt dissection of the fossa (see Fig. 7). By doing so, the component "muscle block" of the velopharynx on the dissected side will be freed, so that when the rest of the dissection is completed it will assume a relatively normal anatomical position. Following dissection of the fossa, the attach-

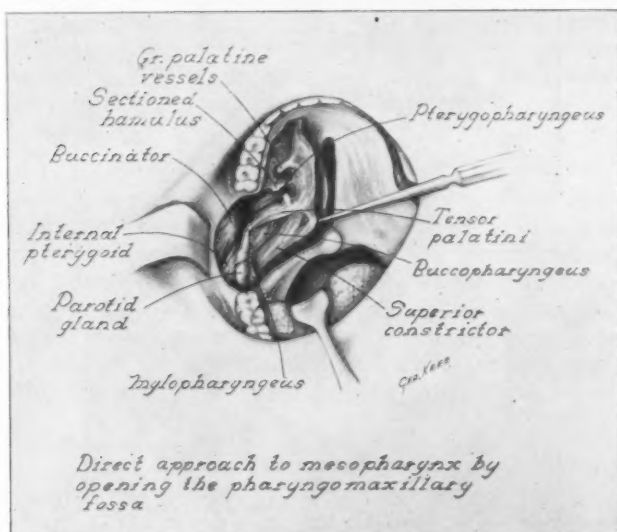


Fig. 8.

ments of the superior constrictor to the posterior border of the horizontal plate of the palatine bone and the lower third of the medial pterygoid plate are severed. This maneuver allows the surgeon to elevate the greater palatine vessels from their bed in the pterygopalatine canal, so that when transfixation takes place an adequate blood supply is assured (see Fig. 8).

With the lateral dimension of the muscular velopharynx dissected free, it has been our plan not only to cross-hatch but also to de-epithelize completely the mesial surface of this mus-

cle group (see Fig. 9); then upon transfixation the split blocks of muscles can unite into one integral unit which, after healing, can function physiologically.

Having completed dissection of one side of the velum, the lateral pharyngeal space is gently packed with dry gauze and the contralateral side is handled surgically in the same manner.

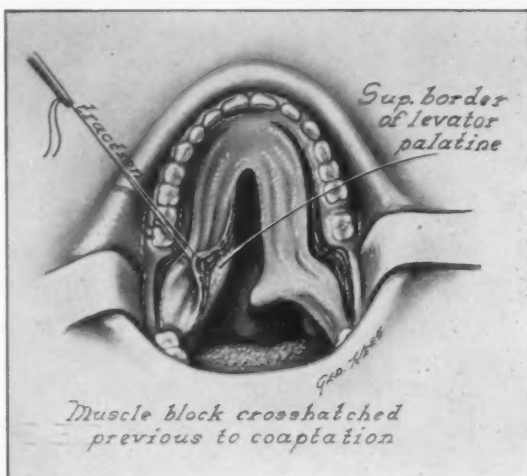


FIG. 9.

As the dissection of both sides becomes complete and the anatomy of the velopharynx is brought into view, anatomically there are presented two independent muscle groups. Each is made up of: 1. The tensor, laterally; 2. The superior constrictor of the pharynx; 3. The levator; 4. The salpingopharyngeus; 5. The palatopharyngeus; 6. The palatoglossus.

We have termed these groups "muscle blocks," for in reality they constitute two highly-integrated blocks of muscles which heretofore have acted independently. By transfixing and uniting them in their normal anatomical habitat, good velopharyngeal function will result.

When the dissection of both halves of the velum is completed and the lateral pharyngeal spaces are opened widely, it becomes apparent that the whole muscular velum can be transfixed through the lateral pharyngeal spaces (see Fig. 10). Working in these anatomical spaces permits the surgeon to unite more perfectly the two muscle blocks that are eventually going to form a functioning palatopharyngeal sphincter. For this purpose we have routinely used through-and-through

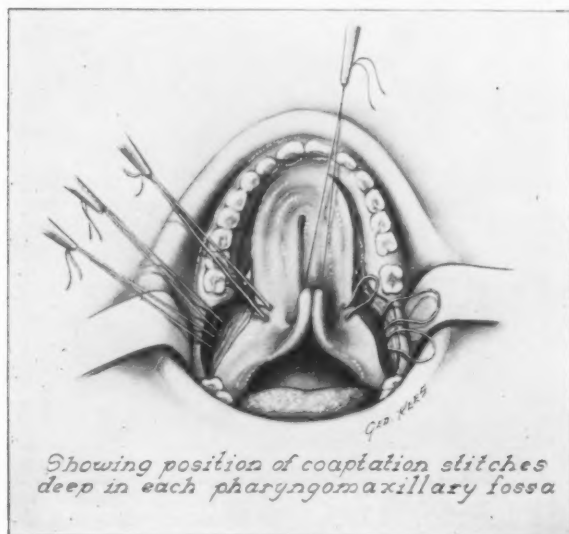


Fig. 10.

sutures of No. 0 chromic catgut. Fig. 11 demonstrates the coapted and sutured mucous membrane of the ventral and dorsal surfaces of the velum. With the muscular velum transfixed, the lateral pharyngeal spaces stand wide open. It has been our practice to simply pack them lightly with Oxycellulose gauze to control any oozing which may occur following surgery. These spaces are not touched afterward and usually have healed by granulation within a period of two weeks following the operation.



Fig. 11

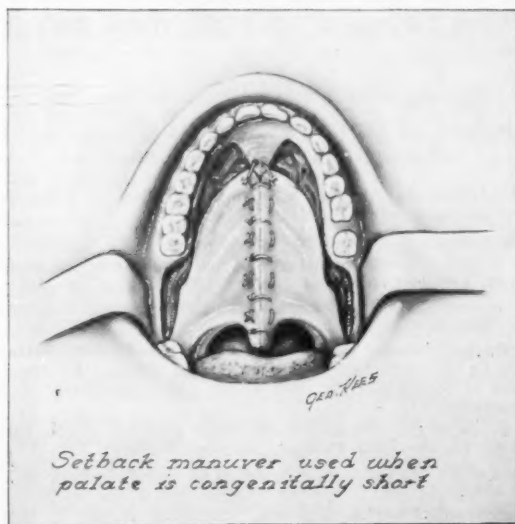


Fig. 12.

We have consistently used lateral pharyngeal space dissection when doing retroposing procedures of the velum. In dealing with congenitally short palates, or those presenting a sub-mucous cleft, we have found that this method lends itself admirably to the transposing technique. The same principle also applies to those cases which have been previously operated on with failure and which contain considerable scar tissue, with shortening of the velum (see Fig. 12).

SUMMARY AND CONCLUSIONS.

A review of the literature has been done to determine those methods which have most practical application to the reconstruction of the palatopharyngeal sphincter. An attempt has been made to throw into sharper focus the importance of the anatomical position of the muscles, nerves, and blood supply of the velopharynx and its surrounding pharyngeal spaces. It has been our experience that by a more complete anatomical understanding of these structures, the surgical approach to their reconstruction through the lateral pharyngeal spaces has assured us of functional results that far surpass those obtained in the past. These conclusions are based on results in a series of 120 cases of lateral pharyngeal space dissection.

APPENDIX.

CHRONOLOGY OF DEVELOPMENT IN PRACTICAL TREATMENT OF SPLIT PALATE AND VELOPHARYNX.

- 1013-1106 Albuscasis, Arabian physician, was first to write on deformities of the mouth (Garrison, 131-132).
- 1739 Sharp wrote of cleft palate as "not uncommon" (Dorrance, 3).
- 1764 Le Monnier, French dentist, reported first successful repair of cleft velum (Padgett, *Surgical Diseases*, 391).
- circa
- 1770 Sir John Hunter began studies of bone growth (Wylie).
- 1779 Eustache proposed suture of velum to Acad. Med., Paris, and was first to call attention to difficulties in deglutition and speech in cases of both surgically split velum and congenitally absent velum (Dorrance, 3).
- 1817 Von Graefe did first successful surgical repair of congenitally split velum (Morley, 28; Padgett, *Surgical Diseases*, 391).
- 1819 Roux of Paris successfully operated on Canadian student (Dorrance, 4).
- 1820 Warren of America did first successful repair in this country (Padgett, *Surgical Diseases*, 391).
- 1823 Froriep was first to sever palatal muscles (*Ibid*).

- 1826 Dieffenbach did osteotomy on horizontal plates of maxillary process (Garrison, 499-500).
- 1827 First to attempt to close cleft by flap dissected from palate itself (Morley, 31).
- 1828 John Collins Warren, Boston, introduced operation of staphylorrhaphy for fissure of soft palate (Garrison, 499-500).
- 1828 Dieffenbach first suggested separation of soft parts of palate from underlying bone (Morley, 28).
- 1829 Dieffenbach closed defect in palate by use of tissue from cheek (Dorrance, 200).
- 1834 Dieffenbach did first successful closure of both hard and soft palate; used lateral incisions; advocated myotomy (Padgett, *Surgical Diseases*, 391).
- 1837 Mettaur, in America, relieved tension by several small incisions in various parts of palate (Morley, 28).
- 1842 John Mason Warren closed hard and soft palate successfully; is sometimes credited with being first to do this (Garrison, 503). He did not use lateral incisions (Padgett, *Surgical Diseases*, 391).
- 1844 Fergusson gave first classic description of function of palatal muscles in cleft palate (Dorrance, 7).
- 1845 Fergusson advocated severance of palatal muscles (Padgett, *Surgical Diseases*, 391).
- 1853 Baizeau claimed originality for Dieffenbach operation (*Ibid*).
- 1861 Von Langenbeck included periosteum in flaps (Smith, 44).
- 1861 Billroth suggested fracture of hamular processes to relieve tension; also claimed originality for Dieffenbach operation (Padgett, *Surgical Diseases*, 391).
- 1862 Von Langenbeck described median suture in detail (Morley, 29).
- 1862 Passavant called attention to nasal twang in speech after closure of palate and proposed corrective procedure (Smith, 44); Morley, 34).
- 1863 Passavant described contraction of superior constrictor muscle on posterior pharyngeal wall (Morley, 36).
- 1870 Tait extended lateral incisions over alveolar ridge whenever necessary to gain greater width of flaps; recognized importance of tensor palati muscles (Smith, 44).
- 1873 Fergusson advocated osteotomy for relaxation (Padgett, *Surgical Diseases*, 391).
- 1877 Lannelongue, first to use mucosal flap from septum for repair (*Ibid*).
- 1889 Billroth deplored lateral incisions (Smith, 45; Morley, 37); he suggested breaking off mesial ptergoid plate (Dorrance, 383).
- 1890 Davis-Colley described "criss-cross" operation for closure of hard palate (Dorrance, 121-124).
- 1893 Bond gave first detailed account of speech defects associated with clefts of the palatopharyngeal sphincter (Morley, 38).
- 1897 Sir Arbuthnot Lane described closure by flap dissected from one side of palate (Morley, 31).
- 1901 Von Eiselsberg repaired cleft with flap from forearm (Morley, 31).
- 1905 Sir James Berry published detailed account of speech results in his series of operations (Morley, 40-41).
- 1911 Blair closed palate with flap from neck (Morley, 31).
- 1917 Rosenthal used flap from upper arm for closure of palate (*Ibid*).

- 1920 Ganzer described method to produce longer velum (Morley, 41; Dorrance, 206).
- 1921 Gillis and Fry performed staphylorrhaphy alone and closed the opening in the hard palate with obturator, thereby destroying the insertion of some palatal muscles (Smith, 45; Morley, 42).
- 1922 Veau analyzed anatomical and functional results of staphylorrhaphy. He advocated a procedure differing entirely from that of von Langenbeck. He "elevated and displaced medially flaps of mucoperiosteum with a single posterior base . . .". Smith calls his work "monumental" (Smith, 45; Morley, 42).
- 1923 Brophy described compression method of closure (Morley, 33).
- 1925 Dorrance presented the "push-back" operation to lengthen and relax the velum (Smith, 45-46; Dorrance, 403-439).
- 1926 Ernst published his conclusions that the mesopharynx is wider and the halves of the maxillae smaller than normal, in patients having cleft velopharynx (Ernst).
- 1927 George Grey Turner reported functional results in a series of cases. Using Langenbeck-Fergusson operation he found little improvement in speech in children under one or two years of age (Morley, 44-46).
- 1928 Wardill reviewed results of cleft palate surgery and concluded that closure was usually achieved by skilled surgeons, but restoration of normal speech was rare, with little improvement in procedure during the past century. He advocated a two-stage operation, based on recognition that in cleft velum the bony nasopharynx is increased in size (Smith, 46-49).
- 1932 Denis Browne described a two-stage modification of the Langenbeck operation (Morley, 52-54).
- 1934 Invention of Broadbent-Bolton roentgenographic cephalometer (Wylie).
- 1937 Wardill presented improved procedure having the following advantages: (1) It is completed in one session, (2) Nasopharyngeal valve action is practically assured, (3) It is applicable to all types of cleft, (4) The V-Y flaps assure maximum length with minimum scar formation, (5) If performed before the speech age, most children will learn to speak naturally without special training," according to Smith (p. 49; see also Morley, 56-59).
- 1946 Padgett described pharyngeal flap operation (Conway). Kemper and colleagues did photographic research on patients in whom a clear view of the superior velar surface and the entire nasopharynx is visible; results may revise our present opinion of muscular action during the production of speech (Smith, 49).

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BRONCHESOPHAGOLOGY COURSE.

The next Bronchoesophagology Course to be given by the University of Illinois College of Medicine is scheduled for November 8-20, 1954. Under the direction of Dr. Paul H. Holinger.

Interested registrants will please write directly to the Department of Otolaryngology, University of Illinois College of Medicine, 1853 West Polk Street, Chicago 12, Illinois.

**ANATOMY AND HISTOLOGY OF THE EXTERNAL
EAR IN RELATION TO THE HISTOGENESIS
OF EXTERNAL OTITIS.**

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and

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The present report is a summary of certain basic anatomic information regarding the external ear, particularly concerning its blood supply and innervation. A series of histological observations has been made of normal ears in order to extend this anatomic information to include microscopic detail. The eventual purpose of the anatomic and histologic synthesis is to shed light upon the histogenesis of inflammatory phenomena and their sequelae, which are seen in the external ear under a variety of clinical circumstances¹ and to detect, if possible, any conditioning influence exerted in this region by the peculiar nature of its structure.

The external auditory meatus is lined with stratified epithelium, which usually shows some degree of keratinization. The corium or dermis is variable in thickness in different parts, being thicker where the larger and more numerous apocrine glands are grouped. The epidermis invaginates the dermis to form the sheaths of the hair follicles, which are short, irregularly dispersed, and less numerous in the inner third of the canal than in the outer two-thirds.

The glands found in the dermis are of two kinds: superficially and mainly attached to hair follicles are the sebaceous

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ous glands; deeply placed in close relationship to the cartilage and the vessels near it are the tubular coiled glands, sometimes called ceruminous but more exactly referred to as apocrine glands.²

The ducts of the apocrine glands are long and communicate with the pilo-sebaceous units for the most part, although some of the ducts are branched and empty directly through the epidermis.^{3,4} The size of the apocrine glands is considerable, ranging from 0.5 to 2.0 mm. They are most numerous in the middle third of the canal but are also found on the superior wall close to the tympanum in small numbers.

The ducts of apocrine glands are twisted and curved, are relatively long and have a variable diameter, averaging about 30μ .⁵ The glandular epithelium is tall, cuboidal, with a domed free border. Its cytoplasm contains lipoid and pigment granules which are sudanophilic and fluorescent.⁶ There is a good deal of variation in size and secretory content of the cells, depending upon their activity.⁷ Elongated contractile cells, somewhat larger in the ducts, form a basement layer, which is uniformly present.

THE VESSELS AND NERVES OF THE AURICLE AND EXTERNAL AUDITORY CANAL.

Arteries and Veins. The arteries of the auricle and of the external auditory canal arise from the temporal and internal maxillary. The anterior surface of the auricle and the external portion of the meatus are supplied by the anterior auricular branches of the superficial temporal artery. A branch of the posterior auricular artery, arising from the external carotid, supplies the posterior surface of the auricle. The branches of these two arteries have extensive anastomoses. The blood supply to the deeper portions of the external auditory canal is provided by the deep auricular artery, a branch of the internal maxillary. The anterior, posterior and deep auricular veins generally empty into the external jugular and mastoid veins; a portion of the veins of the external ear empty into the temporal and internal maxillary veins.

Some of the smaller branches of the arteries and veins pierce the membrane which roofs over the cartilaginous meatus. Others traverse clefts in the anterior cartilaginous wall, the fissures of Santorini, and others the fibrous connective tissue which unites the cartilaginous with the osseous meatus. They then ramify in the lining membrane of the auditory canal and form a fine capillary network on the perichondrium. A vascular bundle of considerable size extends along the superior wall of the meatus to the superior periphery of the membrana tympani and passes on to the membrane.

Lymphatics. Politzer⁸ and Rouviere⁹ have pointed out that the lymphatics of the external auditory canal are probably in close connection with the lymphatics on the mastoid process and the parotid gland. Politzer observed that in inflammatory affections of the meatus, the lymphatics in the neighborhood of the ear become enlarged. The lymphatics of the anterior and superior walls of the meatus, the tragus, and the surrounding parts empty into the preauricular glands (on the parotid), those of the lobule, the helix, and the inferior wall of the meatus, empty into the infra-auricular glands (in the angle of the jaw); those of the anti-helix and the concha empty into the mastoid glands (on the apex of the mastoid process), and those of the posterior wall of the meatus, together with those of the Eustachian tube, empty into the deep cervical and retropharyngeal glands.

Nerves. The nerves of the auricle and external meatus are derived from the Vth, VIIth, IXth and Xth nerves. The facial nerve sends the posterior auricular branch to the posterior surface of the auricle; the trigeminal, through its third branch in conjunction with some twigs of the auriculo-temporal, supplies the skin of the auricle and external meatus. The cervical plexus also supplies the external ear through its great auricular branch. From the vagus the nerve of Arnold perforates the posterior wall of the meatus and supplies the lining membrane; a larger branch extends along the superior wall of the meatus to the tympanic membrane.

METHODS AND MATERIALS.

The external auditory meatus was removed from one or both sides of all cases coming to autopsy in which permission for examination of the head had been given. The series examined here represents 60 ears, removed from 38 persons. After reflection of the scalp by a post-auricular coronal incision usually used for removal of the calvarium, the cartilaginous and attached membranous portion of the external meatus was excised, carrying the inner end of the section to the tympanum and transecting the canal just within the tragus. Not all specimens could be removed completely, especially at the internal margin, which was sometimes torn away from the bony part of the external acoustic meatus during dissection.

Each specimen was sectioned in four blocks, an outer and inner half of the cartilaginous portion (in adults, this averages 8 mm. in length) and an outer and inner block of the skin and subcutaneous tissue detached from the osseous portion. These blocks were oriented by marking their outer anterior edges with India ink. Sections were cut by the step-section technique, that is, a series of six to ten sections serially with interruptions of about 0.5 mm. In this way the detailed histology of each 0.5 mm. of the external meatus was made available for study, while the total number of sections was held within reasonable limits.

The age grouping of the specimens examined was as follows: Newborn, 12; 1 to 10 years, 4; 10 to 20 years, 2; 20 to 50 years, 9; over 50 years, 11.

Since the objective was the study of the normal, evidence of pathologic processes of the ear eliminated the specimen. Three cases (two in the age bracket 20 to 50 and one over 50) were thus discarded.

OBSERVATIONS.

In the specimens in this series, the lining epithelium of the meatus was as a rule abundantly keratinized, even in infants. The layer of connective tissue just beneath the epidermis has

a discrete appearance because of its loose texture and more prominent capillaries.

The glandular elements were found to vary in different parts of the meatus as follows:

	Sebaceous Glands	Apocrine Glands
Outer Cartilaginous.....	Numerous.....	Moderate Number
Inner Cartilaginous.....	Numerous to Few.....	Numerous
Osseous.....	Rare.....	Occasional

The relationship of the apocrine ducts to the adjacent structures was variable. In a count of 100 ducts which could be traced in sections, 83 opened into pilosebaceous units; 12 were traced to direct openings on the surface, and the rest seemed to have branches suggesting the possibility of one gland having both types of exit. Occasionally an apocrine duct showed an expanded segment, a type of ampulla or utricle, lined by stratified epithelium close to the surface.

The epithelium of the apocrine glands varied in height and in content of secretion. Tall columnar cells were found in smaller acini, and low cuboidal ones in dilated acini. Adjacent glands may show this variation as a normal phenomenon. The cells had spherical nuclei basally situated, with pigment granules between them and the free border. On the external border, the epithelium was backed by a layer of elongated cells and a hyaline membrane, which appeared distinctly in all locations and age groups. The degree of acinar dilatation which is found in normal tissue can be judged by the variety shown in Figs. 1 to 7.

In cross-section of the external meatus at all levels, from the outermost to the innermost, blood vessels and nerves were readily observed and formed a pattern which was consistent enough to be described. Sections obtained from the osseous part of the meatus have included only the soft tissue within the bone, while those taken through the cartilaginous portion have demonstrated the vessels and nerves on both the outer and inner surfaces of the cartilage.

The blood vessels were found to be distributed in the different layers of the meatal wall in the following way: In the outermost layer, whether in the membrane within the bony portion or on the surface of the cartilaginous portion, the arteries

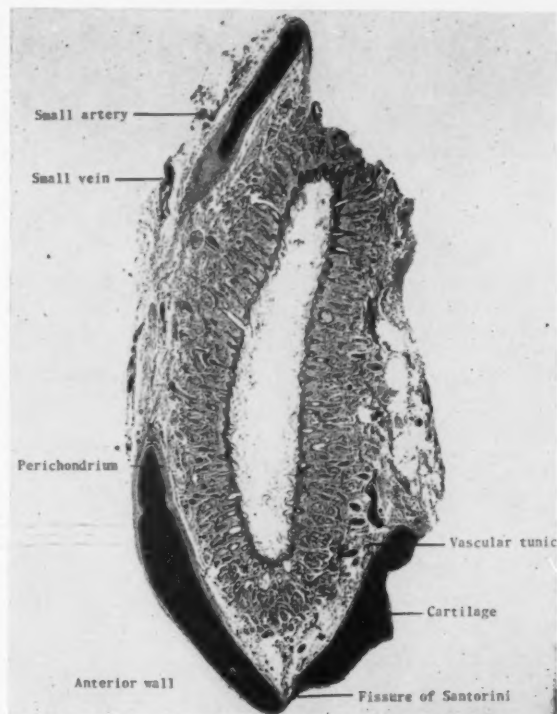


Fig. 1. Cross section through cartilaginous portion of the external auditory meatus of new born ($\times 30$).

had subdivided so that three or more groups of arterial vessels were seen at various distances from each other on the circumference of the canal. The arterioles are 20 to 40μ in diameter and the venules somewhat larger and more variable (see Fig. 1).

Penetration of the blood vessels through the fissures of Santorini and through the membranous layer of the superior and

posterior walls of the canal was regularly noted (see Figs. 1, 2). Arborization in a circular pattern occurred in the internal surface of the perichondrium and at a corresponding depth in the osseous portion just outside the deepest of the

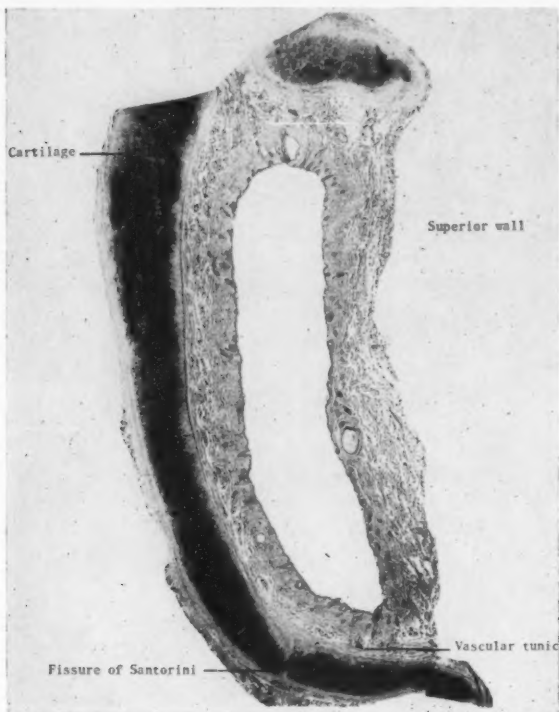


Fig. 2. Cross section through the cartilaginous portion of the external auditory meatus of adult ($\times 20$).

apocrine (ceruminous) glands. The vascularity of this layer was often striking, and the vessels stood out especially clearly on account of the looseness of the fibrous structure (see Figs. 1, 2). In some specimens where the presence of passive congestion had caused distention of the capillaries, the appearance was almost comparable to the plexiform network of the nasal mucous membrane (see Fig. 2). Thus, this layer is referred to here as the "vascular tunic."

The vascular distribution to the integument is seen to be derived from branches, directed toward the lumen. They are, therefore, at right angles to the predominantly encircling vessels of the vascular tunic (see Fig. 3 DV).



Fig. 3. The cartilaginous portion of the external meatus, arterial wall. Female, age 58 (x 60). A-artery. V-vein. N-nerve. C-cartilage. AP-apocrine gland. P-perichondrium. DV-dermal vessels.

Nerve branches were seen abundantly in the outer layers of the wall of the external meatus in all sections examined (see Figs. 3, 4, 5, 6). The position of the nerve bundles has not been any clue to their identification, except that as a rule the nerves lying anteriorly are probably correctly assumed to be derived from the auriculo-temporal branch of the mandi-

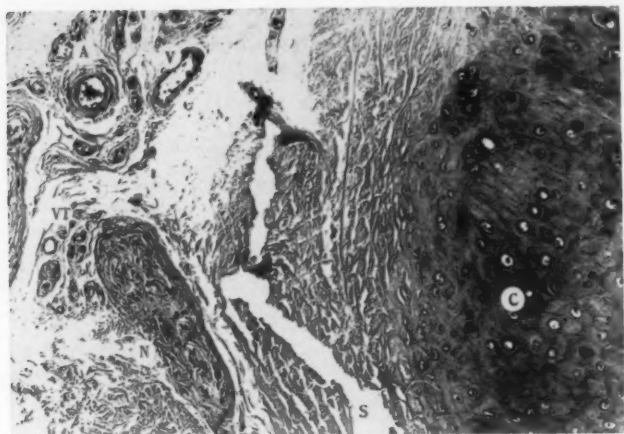


Fig. 4. Cross section at a fissure of Santorini (x 150). S-fissure of Santorini. C-cartilage. N-nerve bundle. A-artery. V-vein. VT-group of small vessels in the vascular tunic.

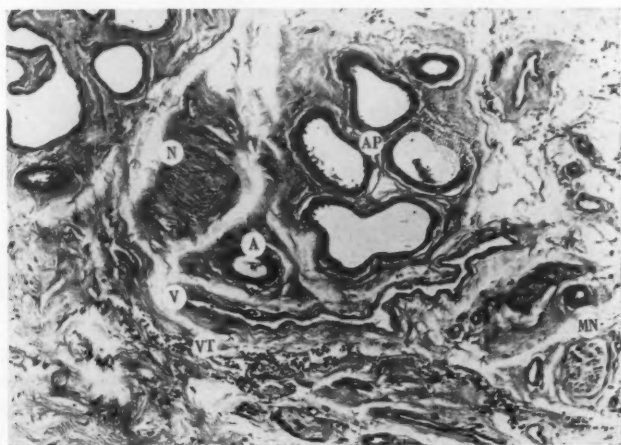


Fig. 5. Structures in relation to the Vascular Tunic (x 150). VT-small vessels of the vascular tunic. A-artery. V-vein. N-nerve. MN-medullated nerve. AP-apocrine gland.

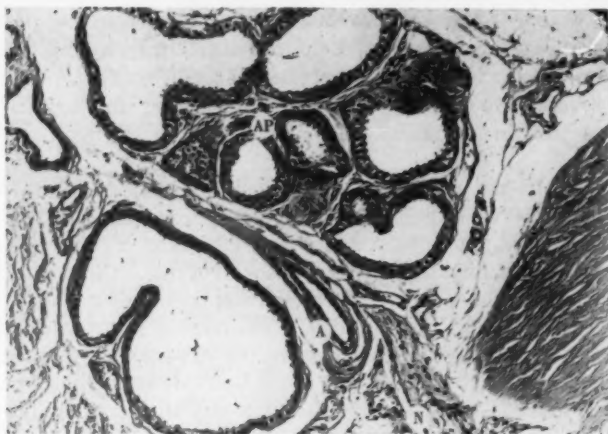


Fig. 6. Vessels and nerves of the glandular layer (x 150). N-nerve (continuous from Fig. 4). A-artery. AP-apocrine glands.

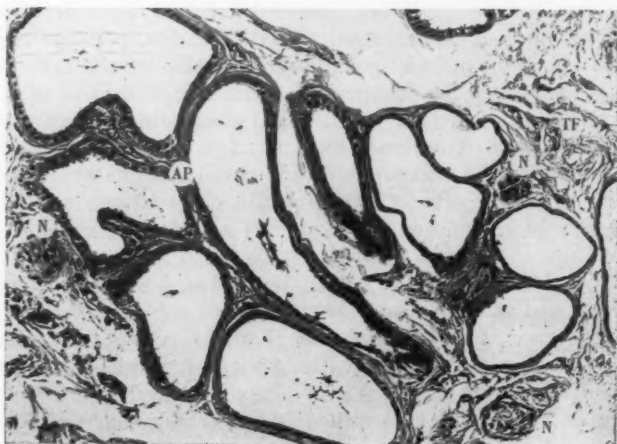


Fig. 7. Nerve endings in skin of external meatus (x 150). AP-apocrine glands. N-nerve. TF-terminal filaments of nerve.

bular trunk of the Vth cranial nerve and those in the posterior wall are probably from the auricular branch of the Xth cranial nerve; however, these fibers branch so that position alone cannot be relied upon for identifying the origin of nerves seen in section.

Most, but not all, of the fibers were non-medullated (see Fig. 5). Nerve bundles in many instances ran parallel to blood vessels. There was, however, no plexus of nerves corresponding in any way to the vascular tunic. Close spatial relationship was observed between nerve bundles and apocrine glands (see Figs. 5 and 6). The nerves approached the glands very closely and often gave the appearance of breaking up into fine plexuses which spread out along the basal contractile layer of the glands. Other non-medullated nerve fibers could be traced to the epidermis where they terminated as free nerve endings among the prickle cells. Around some of the capillary blood vessels, terminal nerve filaments were observed, forming structures resembling the glomus (see Fig. 7 TF).

DISCUSSION.

In this summary of the anatomic and histologic detail of the integument of the external acoustic meatus, principal emphasis has been placed upon the distribution of the arteries, nerves and veins. The purpose of this description is to search for conditioning factors which might reasonably be expected, in view of past experience with reactive phenomena in tissue, to modify the inflammatory and post-inflammatory effects in this anatomic site. Certain of the observations reported here may be considered significant as modifying factors.

1. Considerable weight should be attached to the richness of the vascular supply and the position of the vascular tunic. The existence of this vascular layer affects all types of reactive processes in the meatal lining membrane. The severity of congestion in this area is very likely enhanced by the abundance of small and thin-walled blood vessels such as have been found and described above. Moreover, the location of the vascular tunic within the confines of the cartilaginous groove

must result in increased tissue tension, leading to secondary phenomena, such as compression of nerves, suppression of secretion and necrobiosis. These sequences would result whether the congestion arose from inflammatory, allergic or endocrine causes.

2. Post-inflammatory resolution and healing are probably also conditioned by the topographical arrangements described. In any area of persistent congestion, edema is prolonged. Chronic edema inevitably leads to atrophy of epithelial elements and increase in fibrous tissue. In the ear canal, one result would be interference with apocrine secretion.¹⁰

3. Certain of the features of the vascularity of the integument of the external auditory canal indicate the possibility that this tissue is physically designed to react to vasomotor stimuli in a manner similar to certain mucous membranes, particularly that of the nose. If this is true, then the occurrence of various types of allergic reactivity would be logically predictable.

Such vascular reactions are difficult to distinguish from the congestive phase of acute inflammation, and since they are initiated by physical and chemical factors, the search for infective organisms would be unsuccessful. Some of the contradictory observations previously reported by research workers attempting to determine the etiology of various forms of external ear diseases may, therefore, have been occasioned by failure to recognize the true nature of cases thought to be examples of infection.

SUMMARY.

Sixty normal ear canals from 38 persons have been dissected at autopsies and multiple sections prepared. Anatomic and histologic studies have been made, with particular attention to the blood vessels and nerves of the various layers and their relationship to each other and to the supporting tissues and apocrine glands. A vascular tunic lying deep to the glandular layer has been described.

Attention is called to the highly vascular nature of the

integument of the external auditory canal and to the presence of many nerves. Some of the latter seem to be vasomotor, others secretory. The influence of the structures described in modifying the tissue reactions has been discussed.

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ANNOUNCEMENT.

An introductory course in Reconstructive Surgery of the Septum and External Nasal Pyramid will be given, under the direction of Dr. Maurice Cottle, March 19 through 26, 1955, at the University of Oregon Medical School. This will be sponsored by the Department of Otolaryngology.

REMOVAL OF METALLIC FOREIGN BODY IMBEDDED IN THE RETROPHARYNGEAL SPACE.

Method of More Precise Localization.

LEON M. ARNOLD, M. D.,

and

MAX L. SOM, M. D.,

New York, N. Y.

The localization and removal of small foreign bodies from soft tissues may be an exceedingly difficult and precarious procedure. It is well-known how unpredictable are the results of attempts at operative removal of minute foreign bodies imbedded in the finger or soft tissues, even with wide exposure. The difficulties are much greater when the foreign body is imbedded in the pharynx or esophagus. Here the search is made through a narrow tube at a distance from the eye and in a confined field without benefit of binocular vision. Biplane fluoroscopy is of great help in these cases, but is not available in all hospitals where peroral endoscopy is performed. In its absence, more precise localization of foreign bodies must be attained. A simple method of localization by introducing markers was used in the following unusual case.

J. F., a man 50 years of age, was eating braised beef in a local restaurant. This should not ordinarily contain bones or other hard objects. After swallowing the second mouthful, the patient was stabbed in the throat by a sharp object. Immediately thereafter, he began to choke and tried to induce vomiting by inserting a finger into the throat. Eventually, the choking sensation ceased, and the patient left the restaurant without finishing his meal. He soon noted that he had a stiff neck, and that it became necessary that he hold his head to one side. Any movement of his head or neck produced sharp pain. Later that evening he called his medical doctor who saw no foreign body and prescribed massages and salicylates for his stiff neck.

During the ensuing 24 hours, the patient could neither swallow nor turn his head because of pain. The following day he went to a masseur to have his neck massaged. The dysphagia continued and was accompanied by severe pain in the throat and immobility of the head. This forced him to hold his head in the attitude of one with a severe torticollis.

Forty-eight hours after having eaten the braised beef, the patient presented himself for examination. At this time he had a temperature of 102.6 and appeared to be ill and flushed. He had severe pain on moving the thyroid cartilage and hyoid bone and localized exquisite tenderness over the lateral side of the neck. There was fixation of the

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head and neck due to spasm of the cervical muscles. There was no crepitus or apparent external swelling.

Examination of the pharynx revealed intense edema of the posterior pharyngeal wall with the formation of two longitudinal swellings separated by a midline vertical groove which represented the median raphe. There was marked forward displacement of the posterior pharyngeal wall, extending from the hypopharynx up to the level of the uvula. No ulcerations or foreign bodies were seen.

Examination of the larynx revealed marked edema of both arytenoids, which prevented visualization of the aperture of the larynx.



Fig. 1. Lateral radiograph of neck showing wire imbedded in retropharyngeal space. The marked retropharyngeal swelling and accompanying narrowing of the airway is seen. No free air is visible in the soft tissues.

The patient was admitted to the Beth Israel Hospital on November 7, 1950, where X-rays showed a metallic wire-like foreign body $1\frac{1}{2}$ inches long and 1 mm. in diameter lying in the retropharyngeal tissues at the level of the third cervical vertebra (see Fig. 1). This foreign body lay transversely and extended across the midline. There was marked widening of the retropharyngeal space with accompanying narrowing of the pharyngeal airway. The wire was obliquely situated, the right end being somewhat lower than the left and nearer the vertebrae. There was no free air in the retropharyngeal space (see Fig. 2).

The patient was given large doses of parenteral chemotherapy in the form of Penicillin G, fortified by procaine penicillin, in conjunction with streptomycin. The next morning the patient's larynx was thoroughly anesthetized with cocaine and adrenalin, and a careful search was made for the foreign body. By means of a closed curved forceps, all folds of the pharynx were carefully probed. In addition, with the aid of direct hypopharyngoscopy, the pharynx was explored for a possible clue as to the entering point of the foreign body. This was entirely unsuccessful.

The following day, November 9, four days after ingestion of the foreign body, the patient was again premedicated with demerol and atropine. His pharynx was cocaineized, and intravenous sodium pentothal



Fig. 2. Antero-posterior view of neck showing wire in transverse position at level of third cervical vertebra.

and curare were administered as a general anesthesia. By suspension laryngoscopy, using a Lynch apparatus, the head was suspended, thus exposing the posterior hypopharyngeal wall down to the post-cricoid region.

A longitudinal incision was made to the right of the midline, starting from a point opposite the lower pole of the tonsil and terminating at the level of the arytenoids. It was felt that the knife could encounter the long axis of the foreign body, and would thereby reveal its location.

The incision was deepened down to the anterior surface of the vertebrae. An intensive search was made, but no foreign body could be seen or palpated, and the procedure was abandoned.

A small amount of slough was seen in the deep tissues of the retropharyngeal space, but no actual pus. Because of the extensive retropharyngeal swelling and the additional operative trauma, it was deemed safer to perform a tracheotomy.



Fig. 3. Lateral view of neck showing markers. The foreign body lies between the steel wire suture above and the Michel clip below.

Intensive biotherapy with penicillin and streptomycin was continued. The patient's temperature remained elevated and retropharyngeal swelling persisted. His nutrition was maintained by means of intravenous fluids and vitamins.

Five days after the first attempt at removal, the patient was returned to the operating room. External operation was considered, but the difficulties to be encountered were deemed just as great as with the transoral route. The pharynx was cocaineized and general anesthesia administered.

A Berman foreign body locator was unsuccessfully employed in attempting to locate the foreign body. This instrument produces a whistling sound which increases in intensity when it approaches a metallic object. This foreign body was apparently too fine to register on the machine.

At this point it became apparent that more precise localization of the foreign body was essential. Since the approximate location of the foreign body was known in relationship to the vertebrae, it was decided to localize the wire more definitely by fixing a radio-opaque object to the mucosa above and below the approximate level of the foreign body. This relationship could then be confirmed by further Roentgen films. A steel wire suture was placed in the area, which we estimated to be the uppermost level of the foreign body, and a Michel clip at the lower level. Radiographs revealed the foreign body to be between the wire and the Michel clip. These relationships would remain fixed in any position of the head. A similar method has been employed in locating fragments of needles buried in the fingers. A suspension laryngoscopy was again performed and adequate exposure of the hypopharynx obtained.

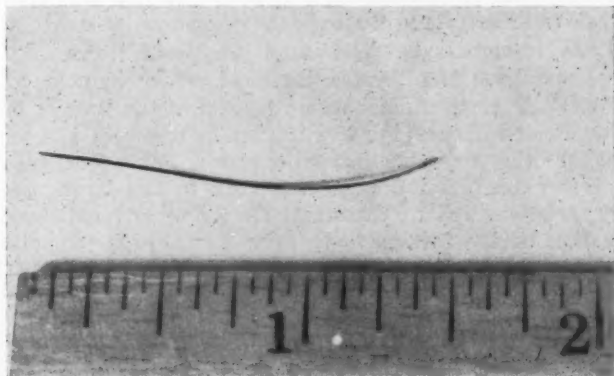


Fig. 4. Foreign body—the wire.

The previous incision was reopened between our visible landmarks. After careful search in the depths of the now confined wound, a black linear object was seen and withdrawn by means of a 16 cm. endoscopic grasping forceps. This object proved to be a curved black spring steel wire 3.5 cm. long and 1 mm. in thickness (see Fig. 4). It was apparently part of a steel wire brush used by butchers to brush their wooden chopping blocks.

The bio-therapy was continued, and after a week the edema had sufficiently subsided to permit removal of the tracheotomy tube. The patient began to take fluids and food by mouth, and was discharged three weeks after entering the hospital with the wound in the posterior pharyngeal wall granulating well. Complete healing occurred after another two weeks. The patient continued to have some stiffness in the neck and pain in moving his head and neck. He has now completely recovered.

SUMMARY.

A case of a fine metallic foreign body imbedded in the retropharyngeal space, which posed real difficulties in removal, has been presented. The significant features in the management of this case are:

1. The use of the Lynch suspension apparatus proved invaluable. Removal by the usual direct laryngoscopy would have been extremely difficult, if at all feasible, without the excellent exposure permitted by suspension laryngoscopy and without the freedom of manipulation by two hands which this method permits.

2. The use of metallic markers to restrict the field of search saved needless probing into edematous tissue in seeking the foreign body. The usual bony landmarks, such as the hyoid bone and thyroid cartilage, which help in roentgenographic localization, are not helpful at the time of endoscopy. The radiographic localization in terms of the vertebrae, or other fixed landmarks, is also not sufficient, because in hyperextending the head and neck in the laryngoscopy, these relationships are distorted. On the other hand the relationships of the foreign body to visible objects temporarily fixed in the mucous membrane, after this relationship has been demonstrated radiologically, is a constant reminder of the field of search.

3. The Berman foreign body locator is of value in localizing larger metallic foreign bodies. It proved to be of no value in localizing the very thin wire in this case. Had the biplane fluoroscope been available, it is likely that less difficulty would have been encountered in localizing the foreign body.

A REDESIGNED DIRECTOR FOR USE IN RHINOPLASTY.*

ALBERT P. SELTZER, M.D.,
Philadelphia, Pa.

One of the tests of skill for the surgeon operating on the nose has often been the exactness with which the cartilages could be cut through. These tissues are particularly elastic in the nose, and so, like rubber, they are difficult to cut through in a straight line and a clean incision.

To avoid the undesirable results that are oftentimes met, a new type of director has been devised for use, particularly in dividing the lower lateral cartilages, when operating on the nasal tip.

The instrument customarily used has been the Neivert director,¹ which is a narrow strip of metal, curved sharply forward in a hook, at the distal end. From this hooked extremity there is a narrow, medial groove extending backward, which is designed to be followed by the knife when making the incision. One drawback in this design is that the director is apt to be put in motion by the action of the knife's cutting through the cartilage (see Fig. 1-a).

The writer's design, (see Fig. 1-b) is a clamp of stainless steel, in the type of the hemostat. The clamp is six and three quarters inches (17 cm.) in overall length, with one blade a quarter of an inch (6 mm.) longer than the other. On the longer blade, the excess length is hooked in a parrot-like beak, at an obtuse angle toward the shorter. Both blades are cross dull-ridged throughout their entire length. They are also fenestrated for nearly the entire length, the slit being wide enough to admit a Bard-Parker No. 15 knife blade.

To use the clamp in operating, the cartilage is drawn out-

* From the Ear, Nose and Throat Department, Graduate Hospital, University of Pennsylvania.

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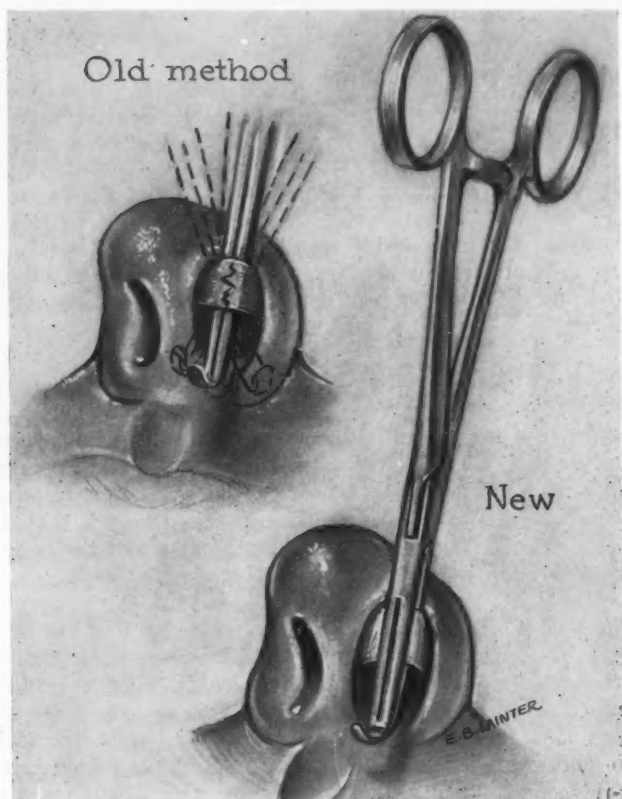


Fig. 1. (a) Nelvert director in use; (b) New design for comparison.

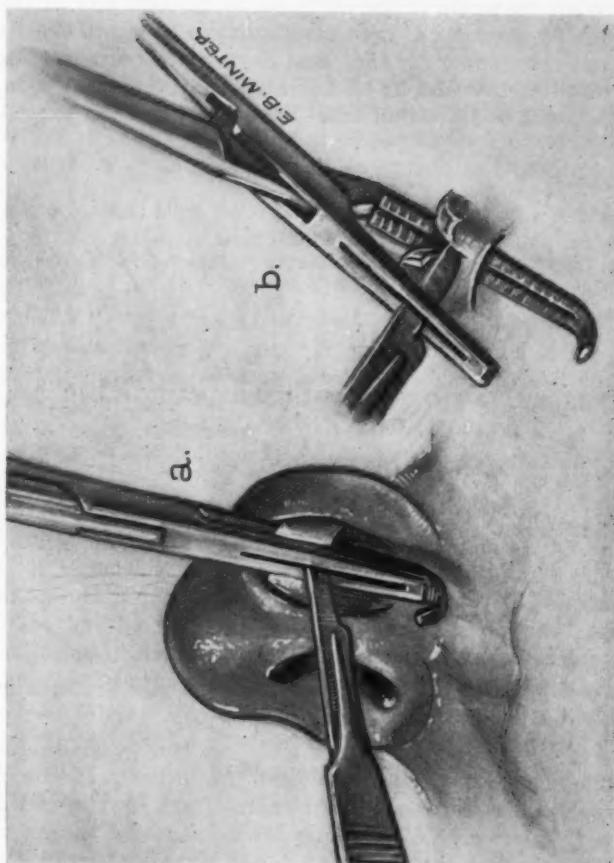


FIG. 2. (a) Seltzer clamp, with knife in position; (b) Clamp blades opened showing knife cutting through and through cartilage.

side the nostril through the primary incision, and so applied that the blades grasp the cartilage, with the slit in the blades following exactly the line of the proposed incision. This may be through the angle of the cartilage, or through any chosen location. By this means, both cartilages can be cut in exactly the same way and with the same degree of accuracy. The final result is that the tip of the nose will be entirely symmetrical, with the external nasal openings appearing exactly alike.

REFERENCE.

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Note: The writer wishes to thank George F. Pilling & Son for making this instrument according to the specifications.

2104 Spruce Street.

THE ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES.

THE MILITARY SURGEON.

ANNOUNCEMENT.

The 61st Annual Convention of the Association of Military Surgeons of the United States will be held November 29 to December 1, 1954, at the Hotel Statler, Washington, D. C. The program will cover a wide range of professional and scientific subjects plus the latest advances in medical and allied sciences, the latter to be shown in a large variety of technical exhibits and films.

For the entertainment of the members and guests, a full schedule of events is being arranged. As in the past, one of the outstanding features is the Honors Night Dinner on December 1, at which the Sir Henry Wellcome medal and prize, the Gorgas medal, the Stitt award, the McLester award, the Louis Livingston Seaman prize, and the Founder's medal will be presented.

The granting of credit points for retirement to eligible Reserve Officers for attendance at meetings is expected to be announced soon by the Department of Defense.

IRRIGATION OF NASOPHARYNX AFTER ADENOIDECTOMY.

D. A. DELISA, M.D.,
Schenectady, New York.

I have had no postoperative hemorrhage following adenoidectomy since I began irrigating the nasopharynx with cold saline at the conclusion of the operation. This technique is reported with the hope that it will prove as helpful to others as it has to me.

At the end of the operation, after the gauze pack is removed from the nasopharynx, saline at about 60° F. is flushed into each nostril with a rubber bulb syringe. The suction tip is held in the pharynx at the same time, and the saline is aspirated before it can reach the glottis. The irrigation is repeated until complete hemostasis is obtained. All clots are washed out, and the vessels are constricted by the cold saline. Incidentally, the patient has a clear nasal airway and is more comfortable after operation without clots in the nasopharynx.

Direct inspection of the nasopharynx, using a headlight and palate retractor, confirm complete removal of tissue and hemostasis. Incomplete removal of tissue is the commonest cause of postoperative hemorrhage. There is no substitute for seeing with the eyes that all tissue and clots are removed.

I do not believe that the irrigation technique will completely eliminate postoperative hemorrhage, but in the 493 cases in which I have used it, not one has occurred. Previously my incidence was about 3 per cent. Incidentally, no medication intended to prevent bleeding is prescribed, but aspirin is prohibited.

1408 Union Street.

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**THE AMERICAN LARYNGOLOGICAL, RHINOLOGICAL
AND OTOLOGICAL SOCIETY, INC., MEETINGS.**

MID-WINTER.

- Eastern Section Meeting.....Friday, January 7, 1955
Philadelphia, Pa., Hotel Warwick
- Triological Council Meeting.....Saturday, January 8, 1955
New York City, The Waldorf-Astoria
- Middle Section Meeting.....Monday, January 14, 1955
Detroit, Mich., Sheraton-Cadillac Hotel
- Western Section Meeting.....Saturday-Sunday, Jan. 15-16, 1955
Los Angeles, Cal., The Town House
- Southern Section Meeting.....Saturday, January 22, 1955
Charlottesville, Va., Medical School Auditorium

SPRING.

- American Board of Otolaryngology
Richmond, Va., March 6-10, 1955

All Society Meetings will be held at the Hollywood Beach Hotel, Hollywood, Florida.

- American Laryngological Association.....March 13, 14, 1955
- Triological Society.....(mornings only) March 15, 16, 17, 1955
- American Broncho-Esophagological Association
(afternoons only) March 15, 16, 1955
- American Otolological Society, Inc.....March 17, 18, 1955

The Hollywood Beach Hotel (American plan) is a delightful place to hold the Spring Meetings — you may wish to bring the family along. The Hotel offers its guests such features as ocean bathing, deep sea fishing, 18-hole golf course and country club, tennis and many other activities.

For hotel reservations please communicate with Mr. John W. Tyler, Manager, Hollywood Beach Hotel, Hollywood, Florida.

**HEARING AIDS ACCEPTED BY THE COUNCIL ON
PHYSICAL MEDICINE OF THE
AMERICAN MEDICAL ASSOCIATION.**

September 1, 1954.

Acousticon Models A-17, A-180 and A-185.

Manufacturer: Dictograph Products, Inc., 95-25 149th St., Jamaica 1,
New York.

Auditone Models 11 and 15.

Manufacturer: Audio Co. of America, 5305 N. Sixth St., Phoenix, Ariz.

Audivox Model Super 67 and 70.

Manufacturer: Audivox, Inc., 259 W. 14th St., New York 11, N. Y.

Aurex Models L and M.

Manufacturer: Aurex Corp., 1117 N. Franklin St., Chicago, Ill.

Beltone Mono-Pac Model M; Mono-Pac Model "Lyric"; Mono-Pac Model "Rhapsody."

Manufacturer: Beltone Hearing Aid Co., 2900 West 36th St., Chicago 32, Ill.

Clearstone Model 700.

Manufacturer: American Sound Products, Inc., 1303 S. Michigan Ave.,
Chicago 5, Ill.

**Dahlberg Junior Model D-2; Dahlberg Model D-3 Tru-Sonic;
Dahlberg Model D-4 Tru-Sonic.**

Manufacturer: The Dahlberg Co., Golden Valley, Minneapolis 22, Minn.

Fortiphone Models 19-LR; 20A; 21-C and 22.

Manufacturer: Fortiphone Limited, Fortiphone House, 247 Regent St.,
London W. 1, England.

Distributor: Anton Heilman, 75 Madison Ave., New York 16, N. Y.

Gem Hearing Aid Model V-60.

Manufacturer: Gem Ear Phone Co., Inc., 50 W. 29th St., New York 1,
N. Y.

Goldentone Models 25, 69 and 97.

Manufacturer: Johnston Hearing Aid Mfg. Co., 708 W. 40th St., Minne-
apolis 8, Minn.

Distributor: Goldentone Corp., 708 W. 40th St., Minneapolis 8, Minn.

Maico Model J; Maico Top Secret Model L; Maico Maxitone.

Manufacturer: Maico Co., Inc., 21 North Third St., Minneapolis, Minn.

Micronic Model "Mercury."

Manufacturer: Audivox, Inc., Successor to Western Electric Hearing
Aid Division, 123 Worcester St., Boston 18, Mass.

Microtone Model T-10; Microtone Model T-612.

Manufacturer: Microtone Co., Ford Parkway on the Mississippi, St. Paul, Minn.; Minneapolis 9, Minn.

Normatone Model C and Model D-53.

Manufacturer: Johnston Hearing Aid Mfg. Co., 708 W. 40 St., Minneapolis, Minn.

Distributor: Normatone Hearing Aid Co., 22 East 7th St., St. Paul (1), Minn.

Otarion Models B-15 and B-30; Otarion Models F-1, and F-3; Otarion Model H-1; Custom "5."

Manufacturer: Otarion Hearing Aids, 4757 N. Ravenwood, Chicago 40, Ill.

Paravox Model D, "Top-Twin-Tone"; Model J (Tiny Myte).

Manufacturer: Paravox, Inc., 2056 E. 4th St., Cleveland, Ohio.

Radioear Model 62 Starlet; Model 72; Model 82 (Zephyr).

Manufacturer: E. A. Myers & Sons, 306 Beverly Rd., Mt. Lebanon, Pittsburgh, Pa.

Distributor: Radioear Corp., 306 Beverly Rd., Mt. Lebanon, Pittsburgh 16, Pa.

Silvertone Model H-16, J-92; Silvertone Model P-15.

Manufacturer: W. E. Johnson Mfg. Co., 708 W. 40th St., Minneapolis, Minn.

Distributor: Sears, Roebuck & Co., 925 S. Homan Ave., Chicago 7, Ill.

Solo-Pak Model 99.

Manufacturer: Solo-Pak Electronics Corp., Linden St., Reading, Mass.

Sonotone Models 910 and 920; Sonotone Model 925; Sonotone Model 940; Sonotone Model 966; Sonotone Model 977; Sonotone Model 988.

Manufacturer: Sonotone Corp., Elmsford, N. Y.

Televox Model E.

Manufacturer: Televox Mfg. Co., 1307 Sansom St., Philadelphia 7, Pa.

Telex Model 99; Telex Model 200; Telex Model 400; Telex Model 500; Telex Model 952; Telex Model 953; Telex Model 1700.

Manufacturer: Telex, Inc., Telex Park, St. Paul 1, Minn.

Tonamic Model 50.

Manufacturer: Tonamic, Inc., 12 Russell St., Everett 49, Mass.

Tonemaster; Model Cameo.

Manufacturer: Tonemasters, Inc., 400 S. Washington St., Peoria 2, Ill

Unex Midget Model 95; Unex Midget Model 110; Unex Models 200 and 230.

Manufacturer: Nichols & Clark, Hathorne, Mass.

Vacolite Models J and J-2.

Manufacturer: Vacolite Co., 3003 N. Henderson St., Dallas 6, Tex.

Zenith Miniature 75; Zenith Model Royal; Zenith Model Super Royal; Zenith "Regent."

Manufacturer: Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.

All of the accepted hearing devices have vacuum tubes.

Accepted Hearing Aids more than five years old have been omitted from this list for brevity.

TRANSISTOR HEARING AIDS ACCEPTED.

Acousticon Model A300; 1 transistor, 2 tubes. Model A-310; 1 transistor; 2 tubes. Model A-330; 3 transistors. Model A-335; 3 transistors.

Manufacturer: Dictograph Products, Inc., 95-25 149th St., Jamaica 35, New York.

Audivox, Model 71; 3 transistors.

Manufacturer: Audivox, Inc., 123 Worcester St., Boston 18, Mass.

Beltone Concerto Model; 3 transistors.

Manufacturer: Beltone Hearing Aid Co., 2900 W. 36th St., Chicago 32, Illinois.

Maico Transist-Ear, Model O; 3 transistors.

Manufacturer: The Maico Company, Inc., 21 N. 3rd St., Minneapolis 1, Minnesota.

Micronic "All American" Hearing Aid; 3 transistors.

Manufacturer: Audivox, Inc., Successor to Western Electric Hearing Aid Division, 123 Worcester St., Boston 18, Mass.

Microtone Model T1 (Red Dot); 3 transistors. Microtone Model T1 (Yellow Dot); 3 transistors. Microtone Model T31 (Micro-Mite); 1 transistor and 2 tubes. Microtone Model Skylark; 3 transistors.

Manufacturer: The Microtone Corporation, Ford Parkway on the Mississippi, St. Paul 1, Minn.

Otarion Model C-15; 1 transistor, 2 tubes. Otariion Model D-1; 3 transistors. Otariion Model F-22; 1 transistor, 2 tubes.

Manufacturer: Otariion, Inc., 4757 N. Ravenswood Ave., Chicago 40, Ill.

Paravox Model K.M. (TRANSONIC); 3 transistors.

Manufacturer: Paravox, Inc., 2056 East 54th St., Cleveland, Ohio.

Radioear Model 820; 3 transistors.

Manufacturer: E. A. Myers & Sons, Inc., 306 Beverly Rd., Mt. Lebanon, Pittsburgh 16, Pa.

Silvertone Model H-25; 3 transistors.

Manufacturer: The Dahlberg Co., Golden Valley, Minneapolis 22, Minn.
Distributor: Sears, Roebuck & Co., 925 South Homan Ave., Chicago 7, Illinois.

Sonotone Model 1010; 1 transistor, 2 tubes. Model No. 1111; 3 transistors.

Manufacturer: Sonotone Corporation, Elmsford, N. Y.

Telex Model 954; 1 transistor, 2 tubes. Telex Model 956; 3 transistors.

Manufacturer: Telex, Inc., Telex Park, St. Paul 1, Minn.

Unex Model TR-3D; 3 transistors.

Manufacturer: Nichols & Clark, Hathorne, Mass.

Zenith Model Royal-T; 3 transistors. Zenith Model Super Royal-T; 3 transistors.

Manufacturer: Zenith Radio Corp., 5801 W. Dickens Ave., Chicago 39, Illinois.

SEMI PORTABLE HEARING AIDS.

Ambco Hearing Amplifier (Table Model).

Manufacturer: A. M. Brooks Co., 1222 W. Washington Blvd., Los Angeles 7, Calif.

Aurex Hearing Aids (three types).

Manufacturer: Aurex Corp., 1117 N. Franklin St., Chicago 10, Ill.

Precision Table Hearing Aid.

Manufacturer: Precision Hearing Aids, 5157 W. Grand Ave., Chicago 39, Ill.

Sonotone Professional Table Set Model 50.

Manufacturer: Sonotone Corp., Elmsford, N. Y.

All of the Accepted hearing devices employ vacuum tubes.

DIRECTORY OF OTOLARYNGOLOGIC SOCIETIES.

(Secretaries of the various societies are requested to keep this information up to date).

AMERICAN OTOLOGICAL SOCIETY.

President: Dr. D. E. Staunton Wishart, 170 St. George St., Toronto 5, Ontario, Canada.
Vice-President: Dr. Wm. J. McNally, 1509 Sherbrooke St., West Montreal 25, Canada.
Secretary-Treasurer: Dr. John R. Lindsay, 950 E. 59th St., Chicago 37, Illinois.
Editor-Librarian: Dr. Henry L. Williams, Mayo Clinic, Rochester, Minn.
Meeting: Hollywood Hotel, Hollywood, Fla., March 17-18, 1955.

AMERICAN LARYNGOLOGICAL ASSOCIATION.

President: Dr. Henry B. Orton, Newark, N. J.
First Vice-President: Dr. Jas. H. Maxwell, Ann Arbor, Mich.
Second-Vice-President: Dr. Clyde A. Heatley, Rochester, N. Y.
Secretary: Harry P. Schenck, Philadelphia, Pa.
Treasurer: Fred W. Dixon, Cleveland, Ohio.
Librarian-Historian: Dr. Bernard J. McMahon, St. Louis, Mo.
Meeting: Hollywood Hotel, Hollywood, Fla., March 13-14, 1955.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

President: Dr. Kenneth M. Day, 121 University Pl., Pittsburgh, Pa.
President-Elect: Dr. Dean M. Lierle, Iowa City, Iowa.
Secretary: Dr. C. Stewart Nash, 277 Alexander St., Rochester, N. Y.
Eastern Section Meeting, Friday, January 7, 1955, Philadelphia, Pa., Hotel Warwick.
Triological Council Meeting, Saturday, January 8, 1955, New York City, The Waldorf-Astoria.
Middle Section Meeting, Monday, January 14, 1955, Detroit, Mich., Sheraton-Cadillac Hotel.
Western Section Meeting, Saturday-Sunday, January 15-16, 1955, Los Angeles, Cal., The Town House.
Southern Section Meeting, Saturday, January 22, 1955, Charlottesville, Va., Medical School Auditorium.
Meeting: Hollywood Hotel, Hollywood, Fla., March 15-16-17, 1955, morning only.

AMERICAN MEDICAL ASSOCIATION, SECTION ON LARYNGOLOGY, OTOTOLOGY AND RHINOLOGY.

Chairman: Dr. F. W. Davison, Danville, Pa.
Vice-Chairman: Dr. Guy L. Boyden, Portland, Ore.
Secretary: Dr. Hugh A. Kuhn, Hammond, Ind.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. Walter H. Theobald, 307 N. Michigan Ave., Chicago 11, Ill.
President-Elect: Dr. Algernon B. Reese, 73 East 71st St., New York 21, N. Y.
Executive Secretary: Dr. William L. Benedict, Mayo Clinic, Rochester, Minn.
Meeting: Waldorf-Astoria, New York City, Sept. 19-24, 1954.

AMERICAN BOARD OF OTOLARYNGOLOGY.

Meeting: Hotel Marshall, Richmond, Va., March 6-10, 1955.
Waldorf-Astoria, New York City, Sept. 13-17, 1954.

AMERICAN BRONCHO-ESOPHAGOLOGICAL ASSOCIATION.

President: Dr. Clyde A. Heatley, 11 No. Goodman St., Rochester, N. Y.
Secretary: Dr. F. Johnson Putney, 1719 Rittenhouse Square, Philadelphia, Pa.
Meeting: Hollywood Beach Hotel, Hollywood, Fla., March 15-16, 1955, afternoon only.

**PUGET SOUND ACADEMY OF OPHTHALMOLOGY
AND OTOLARYNGOLOGY.**

President: Dr. Clifton E. Benson, Bremerton, Wash.
President-Elect: Dr. Carl D. F. Jensen, Seattle, Wash.
Secretary: Dr. Willard F. Goff, 1215 Fourth Ave., Seattle, Wash.

**THE SECTION OF OTOLARYNGOLOGY OF THE MEDICAL SOCIETY
OF THE DISTRICT OF COLUMBIA.**

Chairman: Dr. John Louzan.
Vice-Chairman: Dr. Willard B. Walters.
Secretary: Dr. Jack L. Levine.
Treasurer: Dr. Russell S. Page, Jr.
Meetings are held on the third Tuesday of October, November, March and May, 7:00 P.M.
Place: Army and Navy Club, Washington, D. C.

**THE LOUISIANA-MISSISSIPPI OPHTHALMOLOGICAL
AND OTOLARYNGOLOGICAL SOCIETY.**

President: Dr. W. L. Hughes, Lamar Life Bldg., Jackson, Miss.
Vice-President: Dr. Ralph H. Riggs, 1513 Line Ave., Shreveport, La.
Secretary: Dr. Edley H. Jones, 1301 Washington St., Vicksburg, Miss.

OTOSCLEROSIS STUDY GROUP.

President: Theo. E. Walsh, 640 So. Kingshighway, St. Louis 10, Mo.
Secretary: Dr. Lawrence R. Boies, Med. Arts Bldg., Minneapolis 2, Minn.
Meeting: Waldorf-Astoria, New York City, Sept. 19, 1954.

**AMERICAN SOCIETY OF OPHTHALMOLOGIC AND
OTOLARYNGOLOGIC ALLERGY.**

President: Dr. Albert D. Ruedemann, 1633 David Whitney Bldg., Detroit 26, Mich.
President-Elect: Dr. F. Lambert McGannon, 14900 Detroit Ave., Lakewood 9, Ohio.
Secretary-Treasurer: Dr. Michael H. Barone, 468 Delaware Ave., Buffalo 2, N. Y.
Meeting: Waldorf-Astoria, New York City, September, 1954.

**PAN AMERICAN ASSOCIATION OF OTO-RHINO-LARYNGOLOGY
AND BRONCHO-ESOPHAGOLOGY.**

President: Dr. J. M. Tato, Azcuenaga 235, Buenos Aires, Argentina.
Executive Secretary: Dr. Chevallier L. Jackson, 1901 Walnut St., Philadelphia 3, Pa., U. S. A.
Meeting: Fifth Pan American Congress of Oto-Rhino-Laryngology and Broncho-Esophagology.
President: Dr. J. H. Font, Medical Arts Bldg., San Juan, P. R.
Time and Place: 1956, Puerto Rico.

MISSISSIPPI VALLEY MEDICAL SOCIETY.

President: Dr. Norris J. Heckel, Chicago, Ill.
President-Elect: Dr. Arthur S. Bristow, Princeton, Mo.
Secretary-Treasurer: Dr. Harold Swanberg, Quincy, Ill.
Assistant Secretary-Treasurer: Dr. Jacob E. Reisch, Springfield, Ill.
Meeting: Chicago, Ill., Sept. 22-24, 1954.

THE VIRGINIA SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. G. S. Fitz-Hugh, Charlottesville, Va.
President-Elect: Dr. H. L. Mitchell, Lexington, Va.
Vice-President: Dr. Marion K. Humphries, Charlottesville, Va.
Secretary-Treasurer: Dr. L. B. Sheppard, 301 Medical Arts Bldg., Richmond, Va.
Spring Meeting: Natural Bridge Hotel, Natural Bridge, Va., May 7-8, 1955.

LOS ANGELES SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Harold Owens, M.D.
Secretary-Treasurer: Robert A. Norene, M.D.
Chairman of Section on Ophthalmology: Sol Rome, M.D.
Secretary of Section on Ophthalmology: Wendell C. Irvine, M.D.
Chairman of Section on Otolaryngology: Max E. Pohlman, M.D.
Secretary of Section on Otolaryngology: Herschel H. Burston, M.D.
Place: Los Angeles County Medical Association Building, 1925 Wilshire Boulevard, Los Angeles 57, Calif.
Time: 6:00 P.M., first Thursday of each month from September to June inclusive—Ophthalmology Section. 6:00 P.M., fourth Monday of each month from September to June inclusive—Otolaryngology Section.

AMERICAN OTORHINOLOGIC SOCIETY FOR THE ADVANCEMENT OF PLASTIC AND RECONSTRUCTIVE SURGERY.

President: Dr. Harry Nievert, 555 Park Ave., New York (21), N. Y.
Secretary: Dr. Louis Joel Fleit, 66 Park Ave., New York (16), N. Y.
Meeting: Waldorf-Astoria Hotel, New York, N. Y., Sept. 19, 1954.

NORTH CAROLINA EYE, EAR, NOSE AND THROAT SOCIETY.

President: Dr. Cecil Swann, Asheville, N. C.
Secretary and Treasurer: Dr. Geo. B. Ferguson, Durham, N. C.
Meeting: Joint, with South Carolina Society of Ophthalmology and Otolaryngology, Durham, N. C., Nov. 4-6, 1954.

SOUTH CAROLINA SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

President: Dr. David S. Asbill, Columbia, S. Car.
Vice-President: Dr. John McLean, Greenville, S. Car.
Secretary-Treasurer: Dr. Roderick Macdonald, Rock Hill, S. Car.
Meeting: Joint, with North Carolina Eye, Ear, Nose and Throat Society, Durham, N. C., Nov. 4-6, 1954.

PACIFIC COAST OTO-OPHTHALMOLOGICAL SOCIETY.

President: Dr. Leland G. Hunnicutt, 98 N. Madison Ave., Pasadena, Calif.
Secretary-Treasurer: Dr. John F. Tolan, 3419 47th Ave., Seattle (5), Wash.
Meeting: Honolulu, 1954.

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Program Chairmen:

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Ophthalmology: Dr. Harold F. Whalman, 727 W. 7th St., Los Angeles, Calif.

Mid-Winter Clinical Convention annually the last two weeks in January at Los Angeles, Calif.

**FLORIDA SOCIETY OF OPHTHALMOLOGY
AND OTOLARYNGOLOGY.**

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President-Elect: Dr. Jos. W. Taylor, 706 Franklin St., Tampa, Fla.

Secretary-Treasurer: Dr. Carl S. McLemore, 1217 Kuhl Ave., Orlando, Fla.

THE PHILADELPHIA LARYNGOLOGICAL SOCIETY.

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Vice-President: Dr. Chevalier L. Jackson.

Treasurer: Dr. John J. O'Keefe.

Secretary: Dr. Joseph P. Atkins.

Historian: Dr. Herman B. Cohen.

Executive Committee: Dr. Thomas F. Furlong, Jr., Dr. William A. Lell, Dr. Harry P. Schenck, Dr. Benjamin H. Shuster, ex-officio.

**SOUTHERN MEDICAL ASSOCIATION,
SECTION ON OPHTHALMOLOGY AND OTOLARYNGOLOGY.**

Chairman: Dr. Edley H. Jones, 1301 Washington St., Vicksburg, Miss.

Vice-Chairman: Dr. K. W. Cosgrove, 111 E. Capitol Ave., Little Rock, Ark.

Secretary: Dr. F. A. Holden, Medical Arts Bldg., Baltimore, Md.

Meeting:

**WEST VIRGINIA ACADEMY OF OPHTHALMOLOGY
AND OTOLARYNGOLOGY.**

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AND OTOLARYNGOLOGY.**

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BALTIMORE NOSE AND THROAT SOCIETY

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Secretary-Treasurer: Dr. Walter E. Loch, 1039 No. Calvert St., Baltimore, Maryland.

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COLEGIO MEDICO DE EL SALVADOR, SAN SALVADOR, C. A.**

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Secretary: Dr. Daniel Alfredo Alfaro.

Treasurer: Dr. Antonio Pineda M.

**CANADIAN OTOLARYNGOLOGICAL SOCIETY
SOCIÉTÉ CANADIENNE D'OTOLARYNGOLOGIE**

President: Dr. G. Edward Tremble, 1390 Sherbrooke St., West, Montreal, P. Q.

Secretary: Dr. G. Arnold Henry, 170 St. George St., Toronto, Ontario.

Meeting: Bigwin Inn, Lake of Bays, Muskoka, Ontario. June 16 to June 18, 1955.

MEXICAN ASSOCIATION OF PLASTIC SURGEONS.

President: Dr. Cesar LaBoide, Mexico, D. F.
Vice-President: Dr. M. Gonzalez Ulloa, Mexico, D. F.
Secretary: Dr. Juan de Dios Peza, Mexico, D. F.

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Tesorero: Dr. Alfredo M. Petit.
Vocal: Dr. José Gross.
Vocal: Dr. Pedro Hernández Gonzalo.

INTERNATIONAL BRONCHESOPHAGOLOGICAL SOCIETY.

President: Dr. Andre Soulas, Paris, France.
Secretary: Dr. Chevalier L. Jackson, 1901 Walnut St., Philadelphia 3, Pa.
U. S. A.
Meeting: 3rd International Congress of Broncho-Esophagology.
Time and Place: September or October, 1954, Lisbon, Portugal.

**ASSOCIACAO MEDICA DO INSTITUTO PENIDO BURNIER —
CAMPINAS.**

President: Dr. Heltor Nascimento.
First Secretary: Dr. Roberto Barbosa.
Second Secretary: Dr. Roberto Franco do Amaral.
Librarian-Treasurer: Dr. Leoncio de Souza Quetroz.
Editors for the Archives of the Society: Dr. Guedes de Melo Filho
Dr. Penido Burnier and Dr. Gabriel Porto.

SOCIEDAD CUBANA DE OTO-LARINGOLOGIA.

President: Dr. Reinaldo de Villiers.
Vice-President: Dr. Jorge de Cárdenas.
Secretary: Dr. Pablo Hernandez.

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BRONCOESOFAGOSCOPIA DE CORDOBA.**

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Tesorero: Dr. Juan Manuel Pradales.
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Vice-Presidente: Dr. A. P. Belou.
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Pro-Secretario: Dr. J. M. Tato.
Tesorero: Dr. F. Games.
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OTORRINOLARINGOLOGIA (BOGOTA, COLOMBIA).**

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Secretario: Dr. Felix E. Lozano.
Tesorero: Dr. Mario Arenas A.

SOCIEDAD ESPANOLA DE OTORRINOLARINGOLOGIA.

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Tesorero: Dr. D. Ernesto Alonso Ferrer.

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Y BRONCOESOFAGOLOGIA DE GUATEMALA**

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First Vice-Presidente: Dr. Héctor Cruz, 3a Avenida Sur No. 72.
Second Vice-Presidente: Dr. José Luis Escamilla, 5a Calle Poniente
No. 48.
Secretario-Tesorero: Dr. Horace Polanco, 13 Calle Poniente No. 9-11.

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OTORHINOLARYNGOLOGY.**

President: Dr. Victor M. Noubleau, San Salvador.
Secretary-Treasurer: Dr. Hector R. Silva, Calle Arce No. 84, San Salvador, El Salvador, Central America.

SOCIEDAD DE ESTUDIOS CLINICOS DE LA HABANA

Presidente: Dr. Frank Canosa Lorenzo.
Vice-Presidente: Dr. Julio Sanguliy.
Secretario: Dr. Juan Portuondo de Castro.
Tesorero: Dr. Luis Ortega Verdes.

**FOURTH LATIN-AMERICAN CONGRESS OF
OTORINOLARINGOLOGIA.**

President: Dr. Dario.
Secretary:
Meeting: Lima, Peru, 1957.

SIXTH INTERNATIONAL CONGRESS OF OTOLARYNGOLOGY

President: Dr. Arthur W. Proetz, Beaumont Bldg., St. Louis, Mo.
General Secretary: Dr. Paul Holinger, 700 No. Michigan Ave., Chicago
(11), Ill.
Meeting: Statler Hotel, Washington, D. C., May 5-10, 1957.

**SOCIEDADE PORTUGUESA DE OTORRINOLARINGOLOGIA
E DE
BRONCO-ESOFAGOLOGIA**

Presidente: Dr. Alberto Luis de Mendonca.
Vice-Presidente: Dr. Jaime de Magalhaes.
1.º Secretario: Dr. Antonio da Costa Quinta.
2.º Secretario: Dr. Albano Coelho.
Tesoureiro: Dr. Jose Antonio de Campos Henriques.
Vogais: Dr. Teofilo Esquivel.
Dr. Antonio Cancela de Amorim.
Sede: Avenida da Liberdade, 65, 1.º, Lisboa.





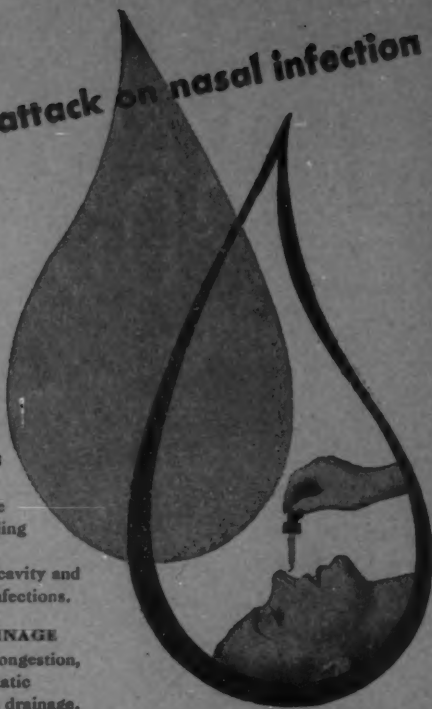
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